321

SENIOR SECONDARY COURSE
INTERMEDIATE (TOSS)

COMMUNITY SCIENCE
(HOME SCIENCE)

Telangana Open School Society
(TOSS) Hyderabad

Community Science
(Home Science)

Chief Advisor
Smt. Karuna Vakati, IAS
Secretary to Government, Education Department,
Government of Telangana, Hyderabad.

Chief Editor
Dr. C Anjali Devi, MSc., MA., PhD
Professor (Rtd), Dept. of Food &Nutrition,
Osmania University, Hyderabad.

TEXTBOOK PRINTING COUNCIL

Smt. A Devasena IAS,
Director of School Education
Telangana, Hyderabad

Smt. P.V. Sri Hari
Director TOSS
Telangana, Hyderabad

Sri S. Srinivasa Chary
Director Text Book Press
Telangana, Hyderabad

Coordination Committee

Sri M. Somi Reddy
Chief Coordinator
TOSS, Hyderabad

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Telangana Open School Society (TOSS)
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State Co-ordinators

Smt. G. Tirumala Reddy
TOSS, Hyderabad

Sri B. Venkateswara Rao
TOSS, Hyderabad

TEXTBOOK DEVELOPMENT COMMITTEE

Dr. V. Vijayalakshmi, Professor & Dean, Community Science
Prof. Jayashanker Telangana, State Agricultural University, Hyderabad.

Dr M. Santoshi Lakshmi
Asst. Professor, Dept of Food &Nutrition,
Telangana Mahila Viswavidyalam, Hyderabad.
(Women's University)

Mrs. M. Jaya Surya Kumari
Asst. Professor, Food Science, Dept. of Food Science
Telangana Mahila Viswavidyalam, Hyderabad.
(Women's University)

Mrs. D. Radhika
Asst. Professor, Dept. of Apparel & Textiles
College of Community Sciece,
Prof. Jayashanker Telangana State Agricultural University, Hyderabad

V. Venkat Swamy
Techinical Support Person, TOSS, Hyderabad.

Cover Page Designing.
Dr. Santhoshi Lakshmi,
Dr. C. Anjali Devi:
Mrs. G. Tirumala Reddy

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FORWARD

Education plays an important role in the present society . Modern society has undergone several changes in social, economic, cultural, scientific, and occupational areas. Vast expanding communication spheres has led to more changes among all sections of people in the community. In this scenario, the department of education is giving equal importance to nonformal education through State Open School Society. Therefore non-formal education has to play a major role along with formal education in shaping the Individual, the Home, the Community and the Nation at large. In these circumstances Community Science (Home Science) has to play a major role in the present day development of the community, since it deals with all aspects of the family and the community, be it social, cultural or economic. Therefore like all other courses it is necessary that Community Science (Home Science) should also be a job-oriented course so that one who studies the course will be eligible to work.

There are number of employment opportunities open to Community Science (Home Science) students, today. The NEP 2020 insists onformal education from nursery level itself , Dieticians are being appointed in every hospital, as it become mandatory to have a dietician in every hospital. Food manufacturing companies are recruiting food scientists. Community Science (Home Science) courses should therefore be tailored to meet these raising demands from early stages of life.

In order to impart these values, it will be appropriate to introduce Community Science (Home Science) from Intermediate Education itself. Urbanisation made several boys and girls from rural areas to migrate to urban areas in pursuit of admission in schools and colleges in urban areas. Statistics indicate that there are more dropouts after 10th Class . At a very young age they are left to decide their own future or left to elders to decide for them . Statistics indicate that they invariably pushed into some income generating lowest cadre jobs , this type of illiteracy later leads to social, and economic problems of serious nature. In order to mould the younger generation as proper adults it requires courses which can mould their character and life.

In these circumstances Community Science (Home Science) course plays a vital part in moulding the character of growing children .TOSS therefore felt to offer Community Science (Home Science) from Senior Secondary Education (Intermediate Level) as the motto of Telangana Open School Society is to nurture all dropouts or those who cannot afford formal education.

My sincere thanks are to all those who helped during the development of the Secondary School Course curriculum and the Community Science (Home Science) text book for Intermediate TOSS students. I am happy that this book was brought with hard work , dedication and strong will power of Chief Editor ,the subject developers, , Director and the Core Committee Staff of TOSS.

M/s Karuna Vakati, IAS,
Chief Secretary,
Education Department, Telangana
& Chief Advisor Telangana
Open School Society (TOSS)

Expression of Gratitude

I express my deep sense of gratitude to Smt. Karuna Vakati, IAS, Secretary to Government, Education Department, Government of Telangana, Hyderabad, who thought it necessary to revise the curriculum of Community Science (Home Science) , at a time when there are rapid changes at home and community. I thank her for her support throughout . I thank Smt. A. Devaseena I.A.S. Director of School Education Government of Telangana, Hyderabad for her support.

I am deeply indebted to Prof. P. Geervani, Pro Chancellor of Chinmaya Viswa Vidyapeeth (Deemed University), Former Vice Chancellor of Sri Padmavathi Mahila Viswavidyalaya (Women's University) who readily agreed to be the Chairperson of the Committee to formulate the curriculum and text book for Intermediate Course under the Open School System. Your guidance from planning of the curriculum stage has given great support to the Chief Editor and Course Writers.

I thank Director TOSS Sri. P.V. Sri Hari who has given continuous support and advise on several occasions in the preparation of the course material .

Dr. C Anjali Devi, MSc., MA., PhD
Professor (Rtd), Dept. of Food &Nutrition,
Osmania University, Hyderabad, Telangana

PREFACE

Home Science presently rechristened as Community Science is an interdisciplinary field of study having a wider scientific understanding of the Home and the Community , to improve the quality of life of individuals, family , community and the country at large. It aims to promote professional competence among students both for boys and girls to meet challenges in life and to enable them to pursue higher studies or to undertake gainful employment in various sectors.

Community Science (Home Science) has a definite role to play in the present day development of the community , as it deals with all aspects of community be it social, cultural or economic. Like all other courses it is necessary that Community Science should be a job oriented course so that one who studies the course will be eligible to work. Several opportunities are open for Community Science (Home Science) students – the New Education Policy (NEP- 2020) recommends the integration of classes from Anganwadi's (ICDS) and nursery school education into the main stream of education. Therefore, large number of well trained teachers will be required to teach these young brains . Community Science (Home Science) students who have Child Development and Nutrition in their curriculum will be suitable for these jobs, dieticians in hospital, recipe developers in Food industry are other avenues. An Attempt is made in the present syllabus and course content of this text book of Community Science (Home Science) to meet the raising demands.

Community Science (Home Science) should cater not only to girls but also to boys, because a working of a home will depend on the co-operation of the boy and the girl, and successful upbringing of children will depend on both the mother and the father . Therefore it is necessary that Community Science should be viewed in new angles of vision.

With vast technological and economic changes, families and individuals have become consumers of large array of mass goods, such as processed food, clothing , prefabricated homes, toys and labour saving devises. Community Science (Home science) should be concerned with examination of these facts from the consumers and national point of view.

Urbanisation and increasing proportion of women combining home making with work outside the family , calls for numerous adjustments in the official, personal, familial, social , economic and management issues within the home. Community Science (Home science) is no longer be a discipline earmarked for girls alone. Inculcation of spiritual values, personal hygiene, good grooming, graceful living , nutrition , bringing up children and community services, are important aspects of Community Science (Home science), which boys also need to learn.

Community Science has a broad inter disciplinary basis which include sociology, biology, physical sciences, psychology, education, economics, management, and architecture. Community Science integrates these disciplines around the central concern of well-being of an individual in his environment, with strong roots in spiritual and moral values. It is therefore imperative that boys and girls from Secondary School level receive Community Science (Home Science) education as integral part of their curriculum and not as a mere elective only for girls.

Community Science (Home Science) has three major areas of consisting of 1. Food and Nutrition, nutrients and their importance, meal planning, food selection, purchase, storing

and preparation; food spoilage and preservation, health and hygiene, public health, food borne diseases, food infections, health education.

2. Resource Management, house equipment selection and maintenance, space management, environment management., economics and consumer education, consumer problems, consumer rights and responsibilities.

3. Textile Science has identification of textile fibres, yarn construction, textile finishes, fabric construction:, clothing selection and care, maintenance of clothing, drying cleaning, stain removal, traditional textiles. This book has been specially designed incorporating all components related to Home and Community for students admitted in the Community Science (Home Science)curriculum of Senior Secondary Course, (Intermediate Course) offered by Telangana Open School Society under Department of School Education. Government of Telangana . I thank Chief Advisor Smt. Karuna Vakati ,IAS, Secretary to Government Education Department , Government of Telangana, Hyderabad, Members of the Text Book Printing Council, Members of the Coordination Committee, Chairperson Prof. P Geervani, Former Vice chancellor of Sri. Padmavathi Mahila University, Tirupati, Coordinator TOSS, Smt. G. Tirumala Reddy, Course Writers Dr. M. Santhoshi Lakshmi, Mrs. Jaya Surya , Mrs. D. Radhika , Prof. V. Vijayalaksmi for spending their valuable time in bringing out appropriate material, My sincere thanks to the staff of Telangana Open School Society (TOSS) who were involved in bringing this book on Community Science (Home Science) , thanks to all members who were associated in the task of successfully bringing out the Text Book on Community Science (Home Science) for Senior Secondary School (Intermediate Course) .

Dr. C. Anjali Devi, MSc. MA, PhD
Department of Food and Nutrition
Osmania University, Hyderabad, Telangana

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My special thanks are to Smt. G. Tirumala Reddy, Coordinator , for continuous support and guidance in conducting workshops and meetings at various stages of preparation of the Textbook .

I thank Prof. V. Vijayalaksmi , who was very prompt and involved in keeping up the schedules .

Dr. M. Santhoshi Lakshmi, a torch bearer for this assignment is a an individual who helped from preliminary preparations, to the final draft book . she took keen interest in designing cover page , I thank Mrs. Jaya Surya and Mrs. D. Radhika , forspending their valuable time in bringing out appropriate material,

My sincere thanks to the staff of Telangana Open School Society (TOSS) and to all members who directly or indirectly associated with the task of successfully bringing out the Text Book on Community Science (Home Science) for Senior Secondary School (Intermediate Course) offered by Telangana Open School Society.

Dr. C Anjali Devi, MSc., MA., PhD
Professor (Rtd), Dept. of Food &Nutrition,
Osmania University, Hyderabad, Telangana

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22 Time and energy management: Steps in time management, time management strategies, Energy management: Types of work, work simplification methods, fatigue and ways to reduce fatigue.

23 Household Equipment management: Classification of equipment, selection, care and maintenance, method of using different equipment, precautions to be followed in using equipment.

24 Space management: Types of spaces-public/private/utility, importance of space management, tips to manage space in different rooms – kitchen, living room, dining room, loft, bed room, store room etc. Relationship between space and aesthetics-arrangement of furniture, accessories, flower arrangement etc.

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39 Stain removal and dry cleaning: what is a stain, types of stains, methods of removal of various stains;

40 Traditional textiles and crafts of Telangana: pochampallyikkats, Gollabhama saris of Siddhi pet, Narayan pet and Gadwal saris, durries and carpets of Warangal, batik; handicrafts of Telangana – Nirmal Paintings, Bidri crafts, silver philigree, Pembarti metal crafts, Cheryala scrolls;

INTRODUCTION TO COMMUNITY SCIENCE

COMMUNITY SCIENCE (Home Science) includes five areas namely, Foods and Nutrition, Human Development and Family Studies, Fabric and Apparel, Resource Management, Communication and Extension. Home science is the application of many sciences and art towards achieving better, health and happier homes.

Importance of Community Science (Home Science):

- Knowledge of Home science improves, quality of life.
- Helps in better utilization of resources to get maximum satisfaction and returns.
- Teaches the application of modern science and technology to improve domestic life.
- Helps to improve family relationships.
- Develops in the students the necessary skills and techniques required for better homemaking and family living
- Helps to solve day to day problems
- Helps in changing the values, attitudes and interests
- Home science promotes the moral, familial and spiritual aspects of family living
- Enables the person for many career opportunities.
- Community Science (Home Science) has an important role to play.

FIVE MAJOR COMPONENTS OF COMMUNITY SCIENCE

Family Science/ Community science degree is offered in various specializations:

1. **Food and Nutrition:** Science behind food, clinical and community nutrition
2. **Resource Management:** Managing resources, interior decoration, and planning
3. **Fabric and Apparel Sciences:** Science of fabrics, garment designing, and maintenance of fabrics
4. **Human Development:** Psychology, child and elderly care, marriage and relationship guidance
5. **Communication & Extension:** Social science, communication, program planning, and training

Branches of Community Science (Home Science) & Specific Areas of Specialization

Main Branch	Area of Specialization
1. Food and Nutrition	Food Science and Food Safety
	Clinical Nutrition and Clinical Biochemistry
	Community Nutrition
	Therapeutic Nutrition
	Sports Nutrition
	Food Preservation
2. Family resource Management	Fuel and Energy Management
	Family Finance Management
	Housing and Equipment
	Interior Decoration
	Consumer Education
3. Textiles & Clothing	Clothing Construction
	Concepts of Fibers and Fabrics
	Textile Designing
	Apparel Designing
	Care and Maintenance of Clothes
4. Human Development	Human Growth and Development
	Adolescence Marriage and Family Guidance
	Needs of the Elderly
	Needs and Care of Special Children
5. Communications Extension	Modes and Significance of Communication
	Development Programmes – Planning and Evaluation
	Entrepreneurship- Training and Capacity Building
	Management of Community Service Organization

INTEXT QUESTIONS

Short questions

1. List the importance of Community Science.

2. Write the areas of Community science and list any two specializations in each area.

Essay Questions

1. Define COMMUNITY SCIENCE and describe the major areas of Community science you have studied along with their areas of specialization.

Activity

List the various professions you come across in your daily routine that need Community science as one of the subjects

Subject /Area of Community science	Profession

MODULE 1
FOOD AND NUTRITION

UNIT - I

NUTRIENTS, CLASSIFICATION AND FUNCTIONS

Food is a basic necessity of life and it nourishes our body. Food is defined as anything consumed drunk which meets the needs for energy, building, regulation and protection of the body.

Foods are made of both energy and non-energy components, which play a major role in our lives. Whether it's a baby, young children, adolescent, or a complete grown-up individual the human body grows at a rapid rate until a particular age.

The components of food are required for fueling the growth and maintaining the body after the growth is stopped.

The energy is obtained in the form of calories that are required by our body cells. The components of food in the form of energy include:

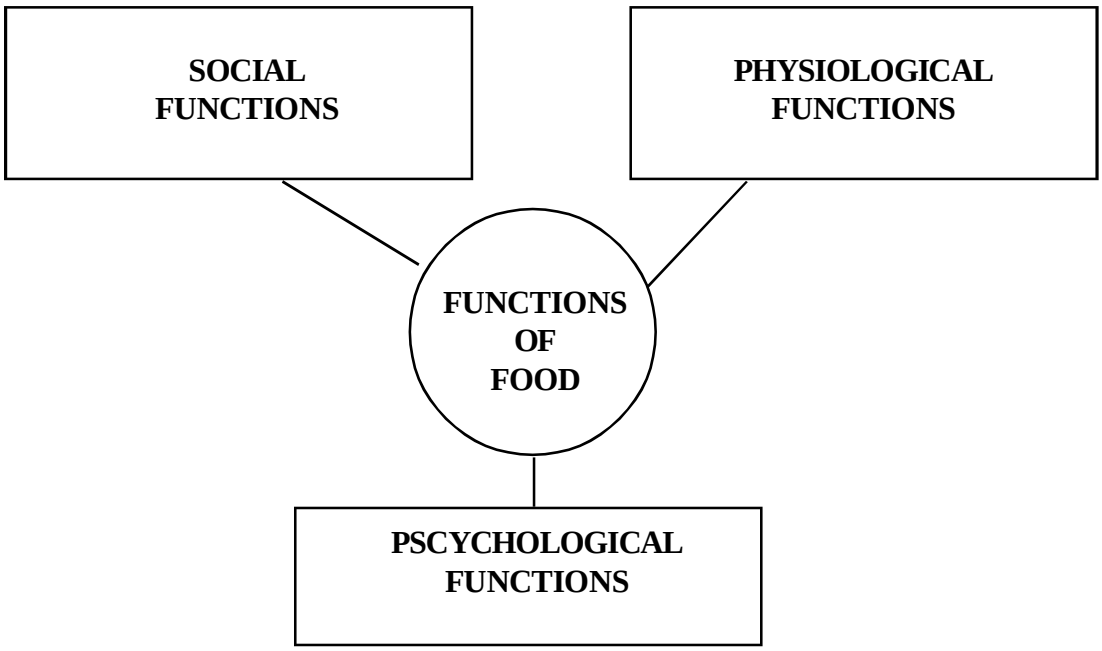
- **Carbohydrates –** It is the primary source of energy for the body. It comprises of sugars that are present in food and directly impact the blood sugar level.
- **Proteins**-Proteins are required to repair, build, and renew the organs and damaged tissues in our body.
- **Fats –** Fats play a vital role in the freight system of transporting several vitamins throughout the body with essential fatty acids.
- **Vitamins and Minerals** do not give energy but they are essential to healthy living.

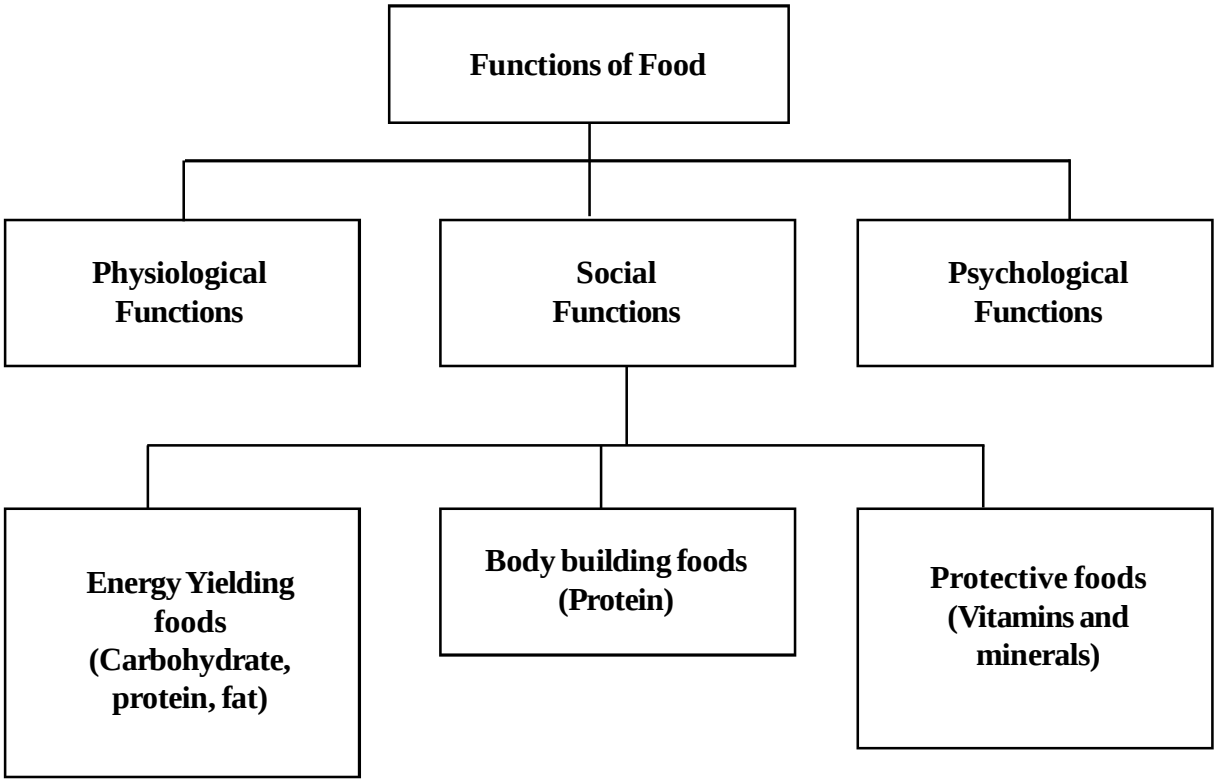
Functions of food

Food is important for life, to be healthy and active, we should certainly have enough food. The food we eat should be safe and rich in all the nutrients for our days need. We should choose and eat a wide variety of foods every day at regular interval.

Foods are classified according to their functions in the body. The functions of food can be broadly classified into three main categories.

FUNCTIONS OF FOOD





1. Physiological functions of food

The physiological functions of food can be further sub-divided as follows:

a. Energy giving

b. Body building

c. Protective and Regulatory

a. Energy giving

This group includes foods rich in carbohydrate, fats and proteins. Energy is defined in terms of kilo calories and thus 1 gram of carbohydrate gives 4 kcal, 1 gram of protein gives 4 kcal, while 1 gram of fat gives 9 kcal.

This group may include Cereals, pulses, simple carbohydrates like sugars nuts and oilseeds, fats and oils and roots and tubers.

Cereals provide, in addition to energy, large amounts of protein, minerals and vitamins in the diet. Pulses also give protein and B vitamins besides giving energy to the body. Nuts and oilseeds are rich in energy as they are good sources of fats and proteins. Roots and tubers though mainly provides energy, contribute to some extent to minerals and vitamins.

b. Body Building

"We are what we eat". Thus one of the most important functions of food is that of building the body. They are

- **Milk, Egg, Meat and Fish:** They are rich in protein of high biological value. These proteins have all the essential amino acids in correct proportion for the synthesis of body tissues.
- **Pulses, Oilseeds and Nuts:** They are rich in protein but may not contain all the essential amino acids required by the human body.

c. Protective and Regulatory function

Foods rich in protein, vitamins and minerals have regulatory functions in the body eg. Maintaining the heart beat, water balance and body temperature. Protective foods are broadly classified into two groups.

- Foods rich in vitamins, minerals and proteins of high biological value eg. milk, egg, fish and liver.
- Foods rich in certain vitamins and minerals only eg. Green leafy vegetables and fruits.

2. Psychological Functions of food

The second major function of food is the psychological function. Food must also satisfy certain emotional needs. These include sense of security, love and attention. Every one of us belongs to a particular culture with its own unique food habits characteristics of that culture.

3. Social function of Food

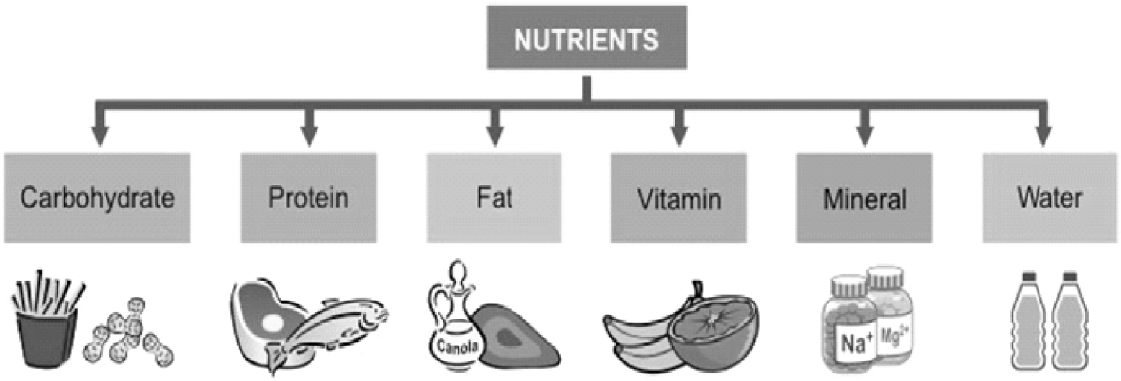
Food is also a symbol of our social life. Sharing food with any other person implies social acceptance. When you share a meal with someone, you are expressing your acceptance of friendship and respect for that person. Food is a medium through which we express our happiness. For example, feasts are given at specific stages of life, such as birth, birthday, marriage etc.

NUTRITION

Nutrition begins with food.

> Nutrition is defined as the means by which the body nourishes itself by transforming food into energy and body tissues.

The science of nutrition concerns everything the body does with food to carry on its functions. Food provides essential substances called nutrients. The body needs these nutrients to help it make energy; to grow, repair, and maintain its tissues; and to keep its different systems working smoothly.



NUTRIENTS

Nutrients are substances required by the body to perform basic functions. Most nutrients must be obtained from our diet, since the human body does not synthesize or produce them. Nutrients have one or more of three basic functions: they provide energy, contribute to body structure, and/or regulate chemical processes in the body.

These basic functions allow us to detect and respond to environmental surroundings, move, excrete wastes, respire (breathe), grow, and reproduce.

Nutrients include proteins, carbohydrates, fat, vitamins, minerals, Fiber, and water. People are more likely to develop certain health conditions if their diet lacks the proper nutrient balance..

The following are some of the important functions of essential nutrients:

- The body's primary source of energy is nutrients.
- They aid in the formation and repair of body tissues.
- Improves fat-soluble vitamin absorption.
- Aids in the production of collagen.
- Gives blood vessels, bones, and ligaments proper structure.
- They also aid in the maintenance of the body's homeostasis.

Macronutrients

Nutrients that are needed in large amounts are called macronutrients. There are three classes of macronutrients: proteins, carbohydrates, and lipids

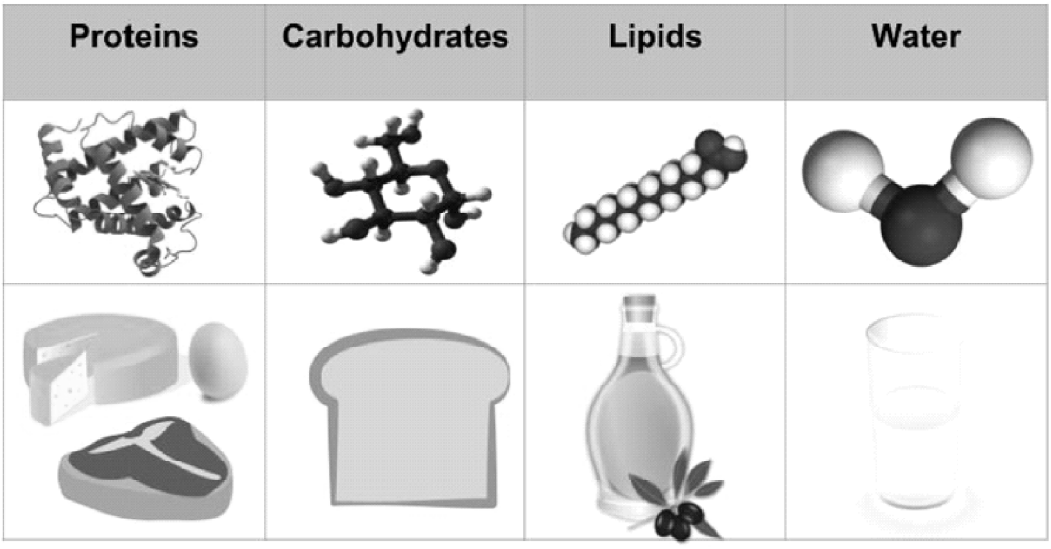


Table 1: Macro Nutrients, their functions and sources

Nutrients	Primary Function	Sources
Carbohydrates	Provide a ready source of energy for the body (4 kilocalories/gram) and structural constituents for the formation of cells.	Plant sources: Cereal grains , vegetables- Roots and Tubers, Fruits, Sweets
Fat	Provides stored energy for the body (9 kilo calories/gram), functions as structural components of cells and also as signaling molecules for proper cellular communication. It provides insulation to vital organs and works to maintain body temperature.	Plant sources: oils from edible nuts such as peanut, sesame seeds, soya bean, mustard, safflower, cottonseed, coconut cashews, almonds etc. Animal sources: Whole milk, pork, poultry, eggs, lard, fish etc
Protein	Necessary for tissue and organ formation, cellular repair and hormone and enzyme production. Provide energy, but not a primary function (4 kilocalories/gram)	Animal sources such as meat , egg, fish, poultry and milk are complete proteins. While incomplete proteins are legumes, pulses, nuts and oilseeds.
Water		
Water	Transports essential nutrients to all body parts, transports waste products for disposal and aids with body temperature regulation	Drinking water, Water from food metabolism, and beverages, juices milk and other liquid foods
Minerals	Regulate body processes, are necessary for proper cellular function, and comprise body tissue.	Cereals, bread, meat, fish, milk, dairy, nuts, fruit (especially dried fruit) and vegetables.
Vitamins	Regulate body processes and promote normal body-system functions.	Fat soluble vitamins - animal fats, vegetable oils, dairy foods, liver, oily fish; Water soluble vitamins : Fruits and vegetables, grains, milk and dairy foods.

Micronutrients

Micronutrients are also essential for carrying out bodily functions, but they are required by the body in smaller amounts. Micronutrients include all the essential minerals and vitamins.

Minerals

Minerals are solid inorganic substances that form crystals and are classified depending on how much of them we need. Trace minerals, such as molybdenum, selenium, zinc, iron, and iodine, are required only in a few milligrams or less. Macrominerals, such as calcium, magnesium, potassium, sodium, and phosphorus, are required in hundreds of milligrams. Many minerals are critical for enzyme function, while others are used to maintain fluid balance, build bone tissue, synthesize hormones, transmit nerve impulses, contract and relax muscles, and protect against harmful free radicals in the body that can cause health problems such as cancer.

Table 2: Minerals, their functions and sources

Minerals and Their Major Functions		
Minerals	**Major Functions**	**Sources**
Macro		
Sodium	Fluid balance, nerve transmission, muscle contraction	Salt, meat, poultry, fish. eggs, milk, pickles, chutneys and processed foods
Chlorine	Fluid balance, stomach acid production	Salt, meat, milk, eggs
Potassium	Fluid balance, nerve transmission, muscle contraction	Meat, Poultry, whole grain cereals, leafy vegetables, oranges , bananas, prunes
Calcium	Bone and teeth health maintenance, nerve transmission, muscle contraction, blood clotting	Milk, heese, some dark green leafy vegetables, paan, ragi, channa dal, rajma, soya beans
Phosphorus	Bone and teeth health maintenance, acid-base balance	Milk and cheese, eggs yolk, meat, poultry, fish, whole grain cereals, legumes , nuts

Magnesium	Protein production, nerve transmission, muscle contraction	Meat, nuts, milk, sea food, cereal grains, fresh green vegetables.
Sulfur	Protein production	Protein foods, eggs, meat, fish, poultry, milk, cheese, nuts
Trace elements		
Iron	Carries oxygen, assists in energy production	Liver and organ meats, muscle meats. Legumes, dried fruits, egg yolk, whole grain and enriched breads and cereals, dark green leafy vegetables and potatoes.
Zinc	Protein and DNA production, wound healing, growth, immune system function	Sea food, liver, meat, eggs, milk, oysters
Iodine	Thyroid hormone production, growth, metabolism	Salt water fish, foods grown in soil bordering salt water, iodized salt
Selenium	Antioxidant	Pork, beef, turkey, chicken, fish, shellfish, eggs and brazil nuts
Copper	Coenzyme, iron metabolism	Liver, legumes, kidney, nuts, raisins, cocoa
Manganese	Coenzyme	Whole grains , legumes, nuts, tea
Fluoride	Bone and teeth health maintenance, tooth decay prevention	Fluorinated water

Chromium	Assists insulin in glucose metabolism	Meats, grains products, fruits, vegetables, nuts, spices, brewer's yeast, beer and Wine
Molybdenum	Coenzyme	Legumes such as black eyed peas and lima beans, whole grains, rice, nuts, potatoes, bananas and leafy vegetables, dairy products, beef, chicken and eggs

Vitamins

The thirteen vitamins are categorized as either water-soluble or fat-soluble. The water-soluble vitamins are vitamin C and all the B vitamins, which include thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folate and cobalamin. The fat-soluble vitamins are A, D, E, and K. Vitamins are required to perform many functions in the body such as assisting in energy production, making red blood cells, synthesizing bone tissue, and supporting normal vision, nervous system function, and immune system function.

Table 3: Vitamins, their Functions and Sources

Vitamins and Their Major Functions		
Vitamins	**Major Functions**	**Sources**
Water-soluble		
Thiamin (B_1)	Coenzyme, helps in energy metabolism	protein foods, lean pork, beef, liver nuts, whole or enriched grains, eggs and fish.
Riboflavin (B_2)	Coenzyme, helps in energy metabolism	organ meats such as liver, kidney, eggs.

Niacin (B_3)	Coenzyme, helps in energy metabolism	poultry, fish, meat, peanuts, beans and peas
Pantothenic acid (B_5)	Coenzyme, helps in energy metabolism	poultry, sea food, beef and organ meats, eggs and milk, vegetables like Mushrooms, avocadoes, potatoes and broccoli, whole grains, peanuts, sunflower seeds
Pyridoxine (B_6)	Coenzyme, amino acid synthesis assistance	egg yolk and skimmed milk powder, lean meat, beef, cheese, legumes, sweet potatoes and yellow corn
Biotin (B_7)	Coenzyme, amino acid and fatty acid metabolism	eggs, milk, bananas, beef liver, walnuts, pork, salmon fish, sunflower seeds, mushrooms, sweet potatoes
Folate (B_9)	Coenzyme, essential for growth	spinach, lettuce, liver, kidney, dry beans and pulses.
Cobalamin (B_{12})	Coenzyme, red blood cell synthesis	liver, kidney and lean meat, milk, eggs and cheese
C (ascorbic acid)	Collagen synthesis, antioxidant	all fresh fruits, vegetables and their juices, citrus fruits such as sweet lime, lemon , oranges, pine apple

	Fat - Soluble Vitamins	
Vitamin A	Vision, reproduction, immune system function	liver sausages, butter, cream and egg yolk green and yellow vegetables, yellow fruits, ripened tomatoes, fortified margarine, mish liver oils
Vitamin D	Bone and teeth health maintenance, immune system function	milk and butter, egg yolk, liver, salt water fish, fish oils and organ meats
Vitamin E	Antioxidant, cell membrane protection	vegetable oil, green leafy vegetables, margarine, egg yolk, milk fat, nuts, wheat germ oil
Vitamin K	Bone and teeth health maintenance, blood clotting	green leafy vegetables, liver, cauliflower and cabbage

Non Nutritive Components of Food: Non-nutrient components are those with no nutritional value and no energy or calories, which are necessary only in small quantities for the body.

It includes roughage (fiber foods), flavors, colors, pesticide residues, and minerals.

Fiber (Roughage): Dietary Fiber is made up of the indigestible parts or compounds of plants, which pass relatively unchanged through our stomach and intestines. Fiber is mainly a carbohydrate. The main role of Fiber is to keep the digestive system healthy.

Dietary Fiber is found in wholegrain cereals and fruit and vegetables. It does not have any nutritional value. It is difficult for the human intestinal tract to digest. It mainly consists of water, thus adding volume to the food by improving intestinal function and controlling hunger. It reduces constipation and helps resolve large intestine disorders. These fibers help in reducing certain cancers and heart diseases. Since it is difficult to digest, it has been included in the non-nutrient components of food. This roughage is divided into two types:

- **Soluble Fibers:** These are fibers that are dissolved easily in water. These soluble fibers help in reducing blood sugar levels and cholesterol.

- Foods with soluble fiber include oatmeal, chia seeds, nuts, beans, lentils, apples, and blueberries.
- **Insoluble Fibers:** These fibers cannot easily dissolve in water. It helps in releasing the stools easily or softening them. The sources of fiber include wheat, fruits, vegetables, oats, meat, and fish.
- Foods with insoluble fibers include whole wheat products (especially wheat bran), quinoa, brown rice, legumes, leafy greens like kale, almonds, walnuts, seeds, and fruits with edible skins like pears and apples.

Phytochemicals:

Phytochemicals are naturally occurring compounds in plant foods such as fruits, vegetables, whole grains, beans, nuts and seeds. Phytochemicals and the compounds that form from them seem to act in a variety of ways to protect health ‘phytochemicals' includes a variety of plant ingredients with different structures that are capable of health-promoting effects.

- A high dietary intake of phytochemicals with vegetables, fruits, nuts, legumes, and whole grain is associated with a reduced risk for cardiovascular and other diseases. Phytochemicals are compounds that are produced by plants ("phyto" means "plant"). They are found in fruits, vegetables, grains, beans, and other plants. Some of these phytochemicals are believed to protect cells from damage that could lead to cancer.

  Phytochemicals are compounds that are produced by plants. They are Carotenoids, Chlorophyll and Chlorophyllin, Curcumin, Fiber, Flavonoids, Garlic, Indole-3-Carbinol

  Isothiocyanates, Lignans, Phytosterols, Resveratrol, Soy Isoflavones

  Some phyto chemicals are believed to protect cells from damage that could lead to cancer.

Phyto chemicals are compounds that are produced by plants ("phyto" means "plant"). They are found in fruits, vegetables, grains, beans, and other plants. Some of these phytochemicals are believed to protect cells from damage that could lead to cancer.

Some scientists think that you could reduce your cancer risk by as much as 40% by eating more vegetables, fruits, and other plant foods that have certain phytochemicals in them. Research has shown that some phytochemicals may:

- Help stop the formation of potential cancer-causing substances (carcinogens)
- Help stop carcinogens from attacking cells
- Help cells stop and wipe out any cancer-like changes

Some of the most beneficial phytochemicals are listed in the table 4

Table 4: Phytochemicals and their Food Sources

Food sources	Phytochemicals
Fruits and vegetables	beta carotene and other carotenoids
Red wine	resveratrol
Tea	polyphenols
Cruciferous vegetables - broccoli, brussels sprouts, turnip greens, and cauliflower	isothiocyanates

Because these phytochemicals are in the fruits, vegetables, beans, and grains, it's easy to include them in diet. A carrot, for example, has more than 100 phytochemicals.

Anti Nutritional Factors: Anti nutrients are compounds typically found in crop plants that interfere with nutrient absorption by the human body.

Substances present in the diet which by themselves or their metabolic products arising in the system interferes with the nutrient utilization, reduce production or affects the health.

These anti-nutritive substances are often referred to as "toxic factors" because of the deleterious effects they produce when eaten by animals.

These are classified based on their chemical properties and on the basis of their effect on utilization of nutrients.

Table 5 Classification of Anti nutrients (Based on their Chemical Properties)

Group	Chemical nature	Examples	Sources
Group 1	Proteins	Protese inhibitor	legume seeds: soyabean, kidney bean, mung bean
		Hemaglutinins or Lectins	Soybean Castor bean (ricin) and other legume seeds
Group 2	Glycosides	Saponins	legumes, mainly broad beans, kidney beans and lentils, llium species (onion, garlic), asparagus, oats, spinach, sugarbeet, tea and yam.

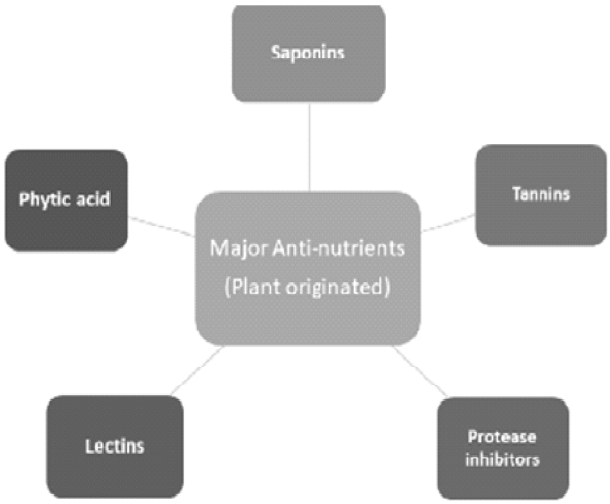
		Cyanogens	1. Amygdalin: Almonds 2. Dhurrin: Jowar and other immature grasses 3. Linamarin: Pulses, Linseed, cassava.
		Glucosinolates (Goitrogens) or Thioglucosides	Cabbage, cauliflower, broccoli, turnip, forms of root cassava.
Group 3	Phenols	Gossypol	whole cottonseed and cottonseed meal
		Tannins	Legume seeds, cider, cereals, peas, green leafy vegetables, coffee, tea, and nuts.
Group 4	Others	Anti vitamins	Grapefruit is very rich in anti vitamin K Raw egg has avidin, an anti vitamin that affects biotin.
		a) Anti minerals b) Aniti B_1, B_6, B_{12} and nicotinic acids	1. Legumes, cereal grains, seeds, nuts, fruits, vegetables contain lectins 2. Spinach, beet greens, beet root, rhubarb, nuts, legumes, cereal grains, sweet potatoes, potatoes contain oxalates 3. Legumes, cereal grains, pseudo cereals (amaranth, quinoa, millet), nuts, seeds contain phytates.
		Anti enzymes	soybeans, lima beans, and kidney beans

Table 6 Classification based on Nutrients that affect Directly or Indirectly

Nutrient affected	Examples	Sources
Substances affecting utilization of proteins	Protease inhibitor	legume seeds: soyabean, kidney bean, mung bean
	polyphenolic components	Beverages like coffee, tea, red wine, fats, dark chocolate.
Substances affecting utilization of minerals	Phytic acid	Seeds, nuts, legumes and unprocessed whole grains
	Oxalic acid	Leafy greens, cocoa, nuts, fruits and seeds
	Glucosinolates (Goitrogens) or Thioglucosides	Cabbage, cauliflower, broccoli, turnip, forms of root cassava
Substances affecting utilization of vitamins:	Anti-vitamin: A,D,E,K.	Grapefruit is very rich in anti vitamin K. Raw egg has avidin, an anti vitamin that affects biotin.

Substances affecting digestion and utilization of carbohydrates:	Amylase inhibitors	Cereal, grains and legumes
	Phenolic compounds	Cocoa, potato, yam, broccoli, dark green leafy vegetables, legumes and cereals, spices and fruits such as cherries and citrus.
	Glucosinolates (Goitrogens) or Thioglucosides	Cabbage, cauliflower, broccoli, turnip, forms of root cassava
	Flatulence factors	Dairy products, dried fruits, fruits like apples, apricot, peach and pear and legumes

ANTI NUTRITIONAL FACTORS



Anti nutrients are found at some level in almost all foods.

Traditional methods of food preparation reduce certain anti nutrients and thereby increase the nutritive quality of plant foods.

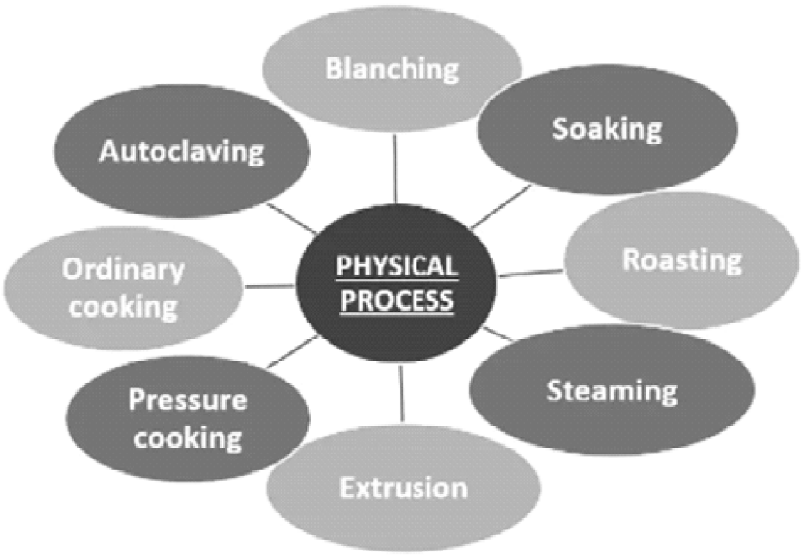
• **Soaking:** in distilled water, 1% NaHCO3 and mixed salt solutions is known to reduce total phenols, tannins and phytates

• **Fermentation:** assorted grain flour with L. acidophilus at 37°C for 24 hours reduce the phytic acid and polyphenol content.

• **Germination:** one of most effective processes which reduce of phytate levels.

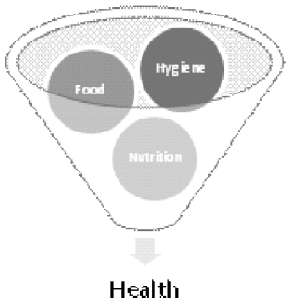
• **Heating:** Cooking whole grains, beans and vegetables will reduce phytic acid, tannins, oxalic acid and Protease inhibitors.

METHODS TO REDUCE ANTI NUTRITIONAL FACTORS



INTER-RELATIONSHIP OF FOOD, NUTRITION AND HEALTH

The health of a person depends on the type and quantity of food stuff consumed. Good nutrition is essential for a person to grow and develop normally and to remain healthy throughout life. When a person does not eat proper food, there are chances of the body not developing normally. There are chances that some organs of the body may start malfunctioning or there may be some disease. Poor nutrition may also adversely influence the mental and social well being nutrition is a prerequisite for good health.



INTEXT QUESTIONS

Short notes

1. Define food?

2. List the three functions of food.

3. Give one example (other than those given in text) of each function of food.

4. List the macro and micro nutrients present in the food.

5. What are the non nutrients components present in the food?

6. Give the phytochemicals present in the food.

7. What are the sources of dietary Fiber in your diet?

8. List the traditional methods which reduce phytochemicals in the food.

Essay Questions

1. Describe the functions of the food.

2. Explain the sources and functions of macro and micronutrients.

3. Give the importance of Non nutritive components of food.

Activity: I. From the last meal you ate, do the following:

i) List all the dishes you ate.

ii) Identify the food items (ingredients) used in each dish.

iii) From the above items, identify the macro and micro nutrients present in them.

iv) From the foods you eat identify the sources of Fiber and phytochemicals.

S.No.	Dishes	Ingredient	Nutrients eaten		Fiber / Phytochemicals
			Macro	Micro	

UNIT - 2

MEAL PLANNING

Meal Planning

Meal Planning involves planning diets which will provide all nutrients in required amounts and proportions i.e. adequate nutrition.

The family's well being and health are dependant on how well they are fed. It is a challenge to every meal-planner to meet it and when done well, it proves to be a satisfying and rewarding experience.

Besides others factors such as digestibility, palatability, economy, family customs, related to religion, food fads etc, it also determines whether the food can be actually supplied and utilized by the individual.

Importance of Meal Planning

The meal planning helps to make the best use of the material, time and financial resources to obtain meals that can help to meet the physical, social and psychological needs of the individual and families.

It is very important to plan family meals in order to fulfill the nutritional requirement of the family members.

This is essential to keep them strong, healthy, and free from any disease and deficiency of any kind.

Meal planning is of utmost importance because it economizes on time, labour and fuel. While planning meals, the methods of working can be carefully thought, so that there is maximum retention of nutrients and minimum losses.

Meals can be planned according to the budget of the family. There can then be maximum utilization of money, if it is spent in the best possible way. One can have a rich diet without buying expensive foods.

Meal planning encourages one to plan within the family means. Meal planning allows one to select different foods from the same food group and avoid monotony. Besides, use of variety of foodstuffs is important from nutritional points also.

Meal planning determines the adequacy of the diet, the kinds of foods purchased, its quality and cost, the way it is stored, prepared and served.

Objectives of Meal Planning

1. To satisfy the nutritional needs of the family members.
2. To keep expenditure within family food budget.
3. To take into account the food preference of individual members.
4. Use methods of cooking which retain maximum nutrients.
5. To economize on time, fuel and energy.
6. To serve attractive and appetizing meals.

Factors Affecting Meal Planning

Meal planning considers a number of factors while planning a simplest family meal or an elaborate company dinner.

These are:

1. Nutritional adequacy: Meal planning must fulfill the family needs and should meet each individual requirement in the family. The best way to ensure nutritional adequacy of a diet is to select the food from all the five food groups.

2. Economy: The amount of money available, depending upon the socio-economic status also effects the meal planning. It is very important to know the less expensive alternative for the more expensive recommended foods, having high nutritive value.

3. Facilities and Help available: The time spent in cooking depends on other facilities and other help likewise availability of servant, using readymade foods, using labour saving devices

4. Satiety value: Any individual meal should provide enough satiety value, so that one does not feel hungry till it is time for the next meal.

5. Personal likes and dislikes: Although the recommended dietary allowances for each of the classes of food should be followed, the individual preferences amongst the foods in each class needs to be considered.

6. Religion, traditions and customs: They are important in determining the food included in the diet, type of meal and the dishes served to the individual of family. For instance, Muslims do not eat pork, whereas Hindus do not eat beef. Rice is considered an auspicious dish at festivals and marriages. Widows are generally not served fish in Bengal. Therefore, religion, traditions and customs should be kept in view while planning meals for a family.

7. Food fads and fallacies: Often receives more publicity than sound nutrition information. Therefore, while planning the meals, one must try and remove these foods fads, so that nutritious meals are provided.

8. Availability of foods stuffs and climate: In earlier times, the dietary habits depended mainly upon the foods produced in a particular area or community, but today with improved methods of foods preservation and distribution, even the most perishable foods are available over large areas.

9. Variety: It is very important, because nobody likes to eat even their favorite food stuff over and over again. Therefore, to introduce variety, do not repeat same food items during day-meal.

10. Schedules of family members: When planning meals, one needs to think of the schedules (time table) of the family members – meal times and the number of meals eaten at home and those that are eaten away from home needs to be considered.

11. Family size and composition: The family size affects the foods that can be served. It is known that the money spent for food per person decreases as the family size increases, when the family income remains constant. Staples such as wheat and rice are bought in larger amounts but quantity of milk, vegetables and fruits is lowered. Thus, the quality of the diet is affected.

12. Meal Times: It is also an important factor in meal planning. The meals should be planned according to the time for meal i.e. whether it is breakfast, lunch or dinner. Normally while planning the meal for whole day, it is seen that 1/3rd of day's requirement are met by lunch 1/3rd by dinner and 1/3rd by

breakfast and evening tea. But this is not a rigid schedule and can be changed according to individual requirement.

13. Occasion: For daily meals the first importance is given to nutritive value. However, for special occasion, special importance has to be given to colour, appearance, number of dishes to be included, but at the same time nutritive value cannot be ignored.

Table 7: Food Groups Classification

Food Group	Main Nutrients
I. Cereals, Grains and Products: Rice, Wheat, Ragi, Bajra, Maize, Jowar, Barley, Rice flakes, Wheat Flour.	Energy, protein, Invisible fat Vitamin B1, Vitamin – B2, Folic Acid, Iron, Fiber.
II. Pulses and Legumes: Bengal gram, Black gram, Green gram, Red gram, Lentil (whole as well as dhals) Cowpea, Peas, Rajmah, Soyabeans, Beans	Energy, Protein, Invisible fat, Vitamin –B1, Vitamin – B2, Folic Acid, Calcium, Iron, Fiber.
III. Milk and Meat Products: **Milk:** Milk, Curd, Skimmed milk,Cheese **Meat:** Chicken, Liver, Fish, Egg, Meat.	Protein, Fat, Vitamin –B12, Calcium. Protein, Fat, Vitamin –B2
IV. Fruits and Vegetables: **Fruits :** Mango, Guava, Tomato Ripe, Papaya, Orange. Sweet Lime, Watermelon.	Carotenoids, Vitamin –C, Fiber.
Vegetables (Green Leafy): Amaranth, Spinach, Drumstick leaves, Coriander leaves, Mustard leaves, fenugreek leaves	Invisible Fats, Carotenoids, Vitamin – B2, Folic Acid, Calcium, Iron, Fiber.
Other Vegetables: Carrots, Brinjal, Ladies fingers, Capsicum, Beans, Onion, Drumstick, Cauliflower.	Carotenoids, Folic Acid, Calcium, Fiber

V. Fats and Sugars: **Fats:** Butter, Ghee, Hydrogenated oils, Cooking oils like Groundnut, Mustard, Coconut.	Energy, Fat, Essential Fatty Acids
Sugars: Sugar, Jaggery	Energy

Significance of the five-food group system

The five food group system can be used for the following purposes:

i. Planning wholesome balanced menus to achieve nutritional adequacy.

ii. Assessing nutritional status – a brief diet history of an individual can disclose inadequacies of food and nutrients from any of the five groups.

Balanced Diet:

A balanced diet can be defined as the one which contains different types of foods in such quantities and proportion that calories, energy and other requirements are adequately met and a small provision is made for extra nutrients to withstand short duration of illness.

A balanced diet should be both adequate and wholesome.

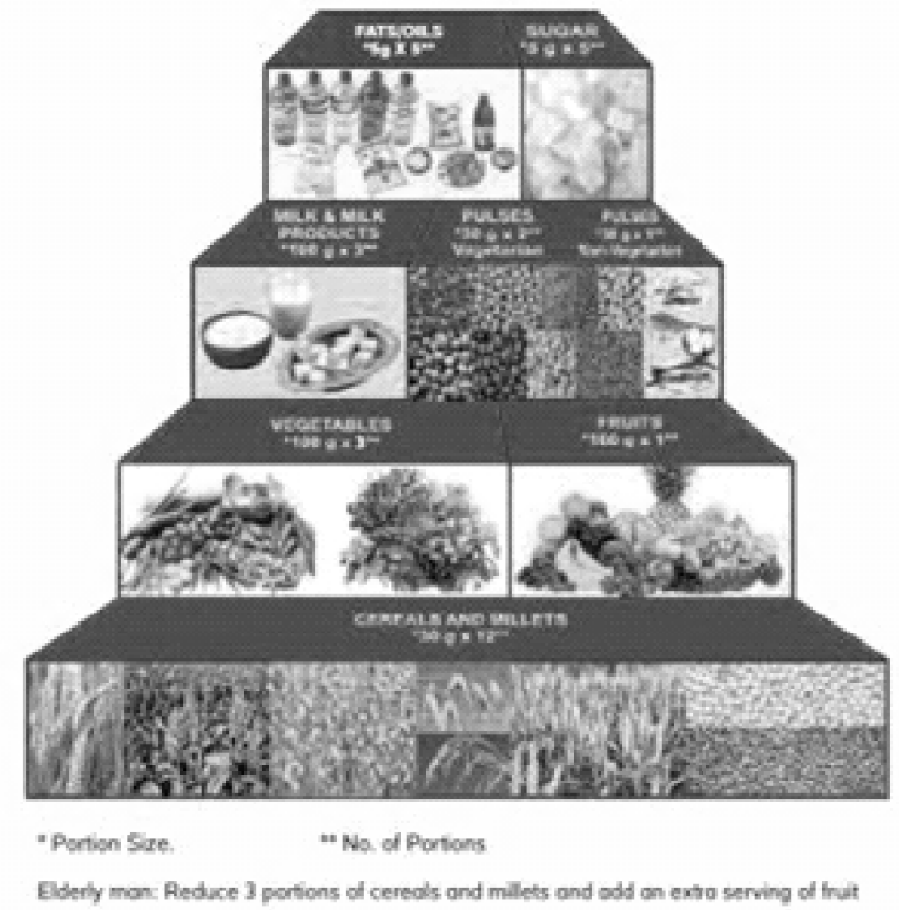
In addition a balanced diet should provide bioactive phyotochemicals such as dietary fiber, antioxidants and other nutraceuticals which have positive health benefits.

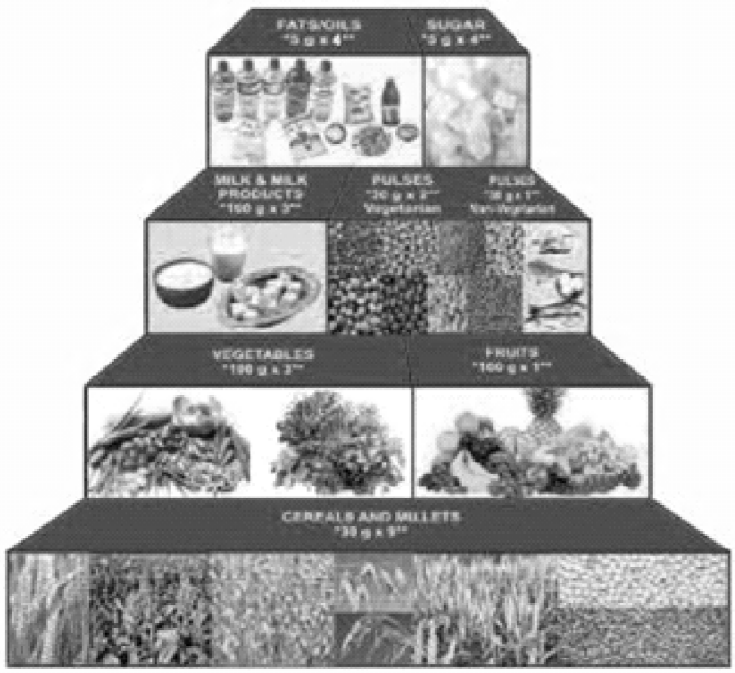
A balanced diet should provide around 60-70 % of total calories from carbohydrate 10- 12% from protein and 20-25% of total calories from fat.

Balanced diet importance:

- It meets nutritional requirement
- Prevents degenerative diseases
- Improves longevity
- Prolongs productive life
- Improves immunity
- Increases endurance level
- Develops optimum cognitive ability
- Helps in coping with stress

Thus balanced diet enhances quality of life.





* Portion Size. ** No. of Portions

Extra Portions:

Pregnant women : Fat/Oil-2, Milk-2, Fruit-1, Green Leafy Vegetables-1/2.

Lactating women : Cereals-1, Pulses-2, Fat/Oil-2, Milk-2, Fruit-1, Green Leafy Vegetables-1/2

Between 6-12 months of lactation, diet intake should be gradually brought back to normal.

Elderly women : Fruit-1, reduce cereals and millets-2.

Recommended Dietary Allowance (RDA): The estimated nutrient allowance that is adequate in 97% to 98% of the healthy population specific for life –stage, age and gender. RDA includes addition of safety factor to the requirement of the nutrient, to cover the variation among individuals; losses during cooking and lack of precision inherent in the estimated requirement.

Requirement + Safety Margin = Recommended Dietary Intake

The RDA is the dietary intake goal for individuals.

The present (2020) committee used recent data on energy expenditure, protein metabolism; and available data on minerals and vitamins losses and absorption to estimate nutrient requirements for Indians.

Significant/Uses of RDA

RDA's help us plan balanced diets which include a variety of foods derived from diverse food groups which help meet the nutrient requirements.

- For establishing Standards for the national feeding programmes implemented by the Governments such as school lunch programmes.
- To interpret food consumption records

- To develop and evaluate new food products developed by the food industry
- To establish guidelines for labeling of food
- To develop nutrition education programmes

Factors affecting RDA are Age, Sex, Body size, Physiological state and type of work.

The RDA may then be considered as The Nutrition Yardstick

Recommended Dietary Allowances (RDA) for Indian Population for the Indian population, the dietary standards have been computed by the Indian Council of Medical Research (ICMR). These recommendations have been published as "Nutrient Requirements and Recommended Dietary Allowances for Indians" (ICMR 2020). The recommendations are constantly revised whenever new data is available. The last recommendations were revised in 2020, based on the new guidelines of the International Joint FAO/WHO/UNU Consultative Group and based on the data on Indians that had accumulated after 1989 recommendations. The present (2020) committee used recent data on energy expenditure, protein metabolism; and available data on minerals and vitamins losses and absorption to estimate nutrient requirements for Indians. Latest statistical approaches were applied to derive the requirements through definitions of their distributions, such that the estimated average requirement (EAR) could be defined for population requirements and adequacies, and the upper 95th percentile of the distribution- the recommended dietary allowances (RDA) could be used to address deficiencies.

1. Note, the RDA for Indians are presented for the different age categories: 0-6 months, 7 to 12 months, 1 – 3 years, 4 – 6 years, 7 – 9 years, 10 – 12 years, 13 – 15 years,16 – 18 years, adult man and women..
2. Recommendations are given for energy and all other nutrients including proteins, visible fat, calcium, iron, retinol, Beta Carotene, thiamine, riboflavin etc.
3. Recommended dietary allowances for adults are based on sex (male, female), body weight and physical activity level (i.e. Sedentary, Moderate and Heavy work).
4. RDA for energy is expressed in kilocalories (Kcal), for proteins, fats in grams (g), and for calcium, iron, vitamins and minerals in milligram (mg) or microgram.
5. RDA for protein is based on body weight. The relationship can be expressed as 0.6-0.8 g protein per kg body weight in the case of adults. It varies for other age categories.
6. RDA for energy and protein are given as additional intakes in pregnancy and lactation, indicated by a (" + " sign). This requirement is over and above the normal requirement of adult women. RDA for other nutrients is given as total intake figures.
7. In infancy RDA's for energy, protein, iron, thiamin, riboflavin and niacin are expressed as per kg body weight (expected for a healthy, normal growing infant of a particular age)
8. RDA for Vitamin A have been given in terms of retinol or alternatively in terms of Beta Carotene

Table 8: Summary of Ear for Energy & Fat Requirements

Age Group	Category	Body weights	(kcal/d)	(kcal/kg/ day)	Fat (g/ day)
Men	Sedentary work	65.0	2110	32	25
	Moderate Work	65.0	2710	42	30
	Heavy Work	65.0	3470	53	40
Women	Sedentary work	55.0	1660	30	20
	Moderate Work	55.0	2130	39	25
	Heavy Work	55.0	2720	49	30
	Pregnant	55 + 10 (GWG)	+ 350		30
	Lactating (0-6m) (7-12m)	55+	+600 +520		30
Infants	0-6m	5.8	530	90	-
	6-12m	8.5	660	80	-
Children	1-3 y	12.9	1110	83	11.7
	4-6 y	18.3	1360	74	18.3
	7-9 y	25.3	1700	67	25.3
Boys	10-12 Y	34.9	2200	64	35
Girls	10-12 Y	34.9	2060	57	45
Boys	13-15 Y	50.5	2860	57	50
Girls	13-15 Y	49.6	2400	49	35
Boys	16-18 Y	64.4	3320	52	40
Girls	16-18 Y	55.7	2500	45	35

There is no RDA for Energy; EAR – Estimated Average Requirements

Table 8: Summary of RDA for Indians 2020

Age Group	Category of work	Body Wt	Protein	CHO	Calcium	Magnesium	Iron	Zinc	Iodine	Thiamine	Riboflavin	Niacin	Vit B6	Folate	Vit B12	Vit C	Vit A	Vit D
		(kg)	(g/d)	(g/d)	(mg/d)	(mg/d)	(mg/d)	(mg/d)	(µg/day)	(mg/d)	(mg/d)	(mg/d)	(mg/d)	(µg/d)	(µg/d)	(mg/d)	(µg/d)	(IU/d)
Men	Sedentary	65	54.0	130	1000	385	19	17	150	1.4	2.0	14	1.9	300	2.5	80	1000	600
	Moderate									1.8	2.5	18	2.4					
	Heavy									2.3	3.2	23	3.1					
Women	Sedentary	55	45.7	130	1000	325	29	13.2	150	1.4	1.9	11	1.9	220	2.5	65	840	600
	Moderate									1.7	2.4	14	1.9					
	Heavy									2.2	3.1	18	2.4					
	Pregnant woman	55 + 10	+9.5 (2nd trimester) +22.0 (3rd trimester)	175	1000	385	40	14.5	250	2.0	2.7	+2.5	2.3	570	+0.25	+15	900	600
	Lactation 0-6m		+16.9	200	1200	325	23	14	280	2.1	3.0	+5	+0.26	330	+1.0	+50	950	600
	7-12m		+13.2	200						2.1	2.9	+5	+0.17	330				
Infants	0-6 m*	5.8	8.1	55	300	30	-	-	100	0.2	0.4	2	0.1	25	1.2	20	350	400
	6-12m	8.5	10.5	95	300	75	3	2.5	130	0.4	0.6	5	0.6	85	1.2	27	350	400
Children	1-3y	11.7	11.3	130	500	135	8	3.0	90	0.7	0.9	7	0.9	110	1.2	27	390	600
	4-6y	18.3	15.9	130	550	155	11	4.5	120	0.9	1.3	9	1.2	135	1.2	32	510	
	7-9 y	25.3	23.3	130	650	215	15	5.9	120	1.1	1.6	11	1.5	170	2.5	43	630	
Boys	10-12y	34.9	31.8	130	850	270	16	8.5	150	1.5	2.1	15	2.0	220	2.5	54	770	600
Girls	10-12y	36.4	32.8	130	850	255	28	8.5	150	1.4	1.9	14	1.9	225	2.5	52	790	600
Boys	13-15y	50.5	44.9	130	1000	355	22	14.3	150	1.9	2.7	19	2.6	285	2.5	72	930	600
Girls	13-15y	49.6	43.2	130	1000	325	30	12.8	150	1.6	2.2	16	2.2	245	2.5	66	890	600
Boys	16-18y	64.4	55.4	130	1050	405	26	17.6	150	2.2	3.1	22	3.0	340	2.5	82	1000	600
Girls	16-18y	55.7	46.2	130	1050	335	32	14.2	150	1.7	2.3	17	2.3	270	2.5	68	860	600

IMPORTANCE OF DIET DURING DIFFERENT STAGES OF LIFECYCLE

Different age groups have different nutritional requirements to support their growth, development and maintenance of health. Here are the nutritional requirements for different age groups:

Infants (0-12 months): Infants need a diet rich in protein, fat, and carbohydrates to support their rapid growth and development. Breast milk is the ideal food for infants, as it contains all the necessary nutrients, including antibodies to protect them against infections. If breast milk is not available, infant formula is a suitable alternative. Infants should also be given vitamin D supplements to support the development of their bones.

Toddlers (1-3 years): Toddlers need a balanced diet that includes carbohydrates, protein, and healthy fats, as well as vitamins and minerals. They should consume a variety of fruits, vegetables, whole grains, and lean protein sources. Toddlers need plenty of calcium, iron and vitamin D to support the development of their bones and muscles. Young children can be choosy but should be inspired to have a broad range of foods. A childs meal can be made more palatable by incorporating nutrients in a visually attractive presentation.

Children (4-12 years): During childhood, children have a tendency to impulsively change their food consumption to go with their growing patterns. Children's diet requires to be differen depending on their development and their degree of physical activity. Similar to energy demands, a child's requirements for proteins, vitamins and minerals augment with age. Children need plenty of calcium, iron and vitamin D to support the development of their bones and muscles. The physical, social and growth-related changes are fast during childhood. As the child is growing, they need protein and essential fatty acids that help develop the brain.

When children go into puberty, which happens for girls between the ages of 10 and 11 and boys in their early teens, they need proteins and nutrients like iron, and other minerals. Hence, this age group needs nutrient-dense meals, comprising wholegrain bread and cereals, fruits, nuts, vegetables, legumes, seafood and lean meats.Parents must include milk, cheese and yogurt in a teenager's diet to boost calcium absorption. This is particularly essential for growing bones.

Adolescents (13-18 years): Their food must be supplemented with crucial minerals like calcium, magnesium, phosphorus, and zinc that help in general development. That includes carbohydrates, proteins, and healthy fats, as well as vitamins and minerals. They should consume a variety of fruits, vegetables, whole grains and lean protein sources. Adolescents need plenty of calcium, iron and vitamin D to support the development of their bones and muscles. They also need more calories than younger children to support their growth spurt.

Adults (19-50 years): Adult nutrition underlines the importance of eating wholesome food for a healthy body and keeping away from diseases. For males and females, the 20-40 age groups require different nutritional consumptions. Pregnant Women in the family way demand additional iron, vitamins, and minerals in their meals.

They should consume a variety of fruits, vegetables, whole grains and lean protein sources. Adults need plenty of calcium and vitamin D to support their bone health. They should also limit their intake of saturated and trans fats, added sugars, and sodium. Also it is necessary for the adults to eat lots of fresh fruits and vegetables as they provide phytochemicals in the diet. It is a time of transition and nutritional requirements change as metabolism changes. Persons in this age group must make sure that they keep good health by incorporating strong antioxidants and phytonutrients in their diet, enhancing digestion, and strengthening their immune systems.

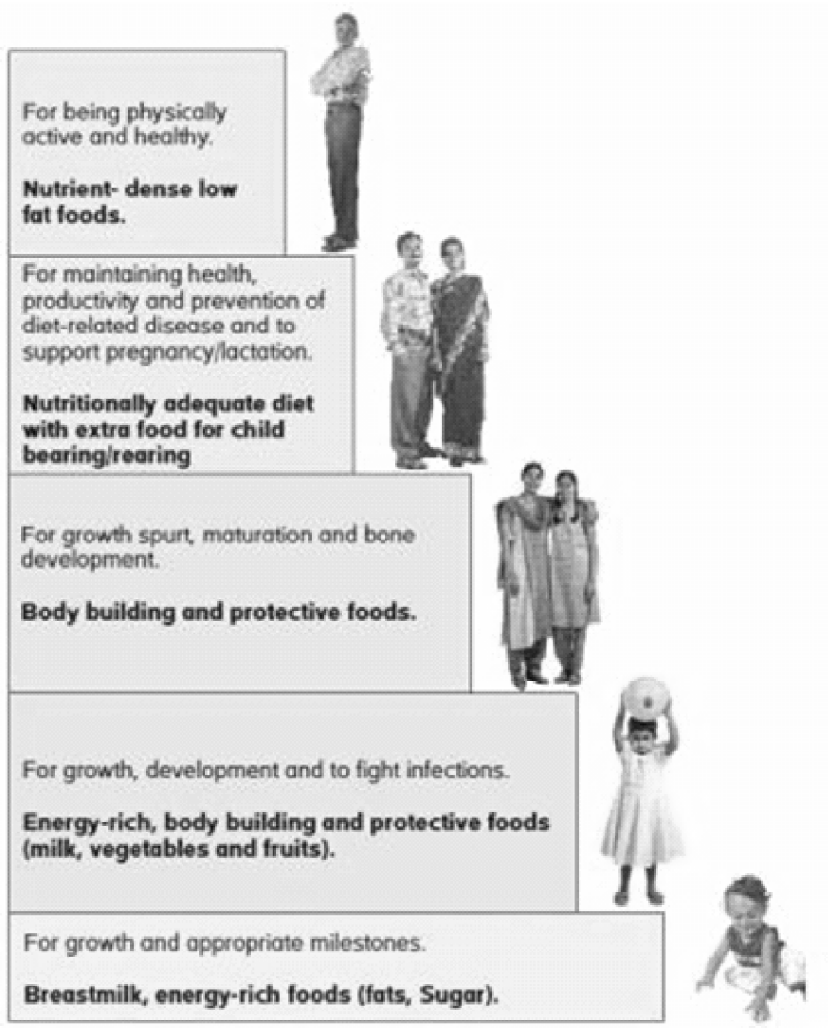
This age group is at hazard for osteoporosis, high blood pressure, heart disease and mood swings owing to hormonal changes. Iron-rich foods such as nuts are tremendous supplies of healthy fatty acids like Omega 3. Berries, avocados, and green leafy vegetables also help ease early-onset symptoms.

Older Adults (50+ years): The diet for older adults should be nutrient-dense because at this age a person's body begins to weaken. Some elderly may not be able to cook their meals alone or may not be able to chew or swallow food well because of dental problems.They should consume a variety of fruits, vegetables, whole grains, and lean protein sources and plenty of calcium and vitamin D to support their bone health. They also need more vitamin B_{12} and vitamin D as they may have difficulty absorbing them from food. For the elderly, fish, eggs, liver, lean meats, low-fat dairy foods, legumes, nuts and seeds, fruit and vegetables, cereals, and whole grain bread are examples of nutrient-dense foods instead of energy-dense ones.

They must not consume high-energy but low-in-nutrition foodstuffs such as sweet biscuits, cakes, and soft drinks. The elderly must eat fiber-rich food that stimulates gut health. Table salt should be used sparingly.

In summary, different age groups have different nutritional requirements to support their growth, development, and maintenance of health. A balanced diet that includes a variety of nutrient-dense foods is key to meeting these nutritional requirements. It is always recommended to consult a healthcare professional or a registered dietitian to understand individual nutritional requirements.

A balanced diet can increase immunity, combat illness-causing toxins, control weight, and lower the risk of high blood pressure, heart disease, stroke, bone loss, type-2 diabetes, and cancer. Accompanied by physical activity, a balanced diet can also support improved independence as you age. Nutrients that become particularly significant as you age comprise protein, vitamin D, vitamin B12, and calcium. Older adults usually require fewer calories. However, their nutrient requirements are the same or even more compared to their younger age. Adults older than 70 require more vitamin D and calcium to help keep up bone health than they did when they were younger. To meet these requirements, one should choose calcium-rich foods and drinks and try to get three servings of low-fat dairy products every day.



Therapeutic diet: A well planned diet provides all the specific nutrients to the body that are needed to achieve nutritional homeostasis in a normal healthy individual. However, in disease conditions, body tissues either do not receive proper nutrients in sufficient amount or cannot utilize the available nutrients owing to faulty digestion, absorption or transportation.

Therefore, normal diet is modified to meet the requirements of the sick individual.

The normal diet may be modified to:

1. Provide change in consistency, in fluid or soft diets.
2. Increase or decrease the energy values.
3. Include greater or lesser amounts of one or more nutrients.
4. Increase or decrease bulk- high and low Fiber diets.
5. Include or exclude specific foods as in allergic conditions.
6. To modify the intervals of feeding.

Factors to be considered in planning therapeutic diets:

1. Underlying diseased condition which requires a change in the diet.
2. The possible duration of the disease.
3. The diet which must be altered to overcome these conditions.
4. The patients' tolerance for food by mouth.

In addition to economic status, the food preferences, occupation and time of meals should be considered.

The four attributes of a therapeutic diet are: Adequacy, Accuracy, Economy and Palatability.

Routine Hospital Diets:

The routine hospital diets include Liquid diet, soft diet, mechanically altered, Fiber restricted diet and regular diet.

(i) Liquid Diet consists of food that will pour or liquid at normal room temperature. In this diet, nutritive value is low and is used only for limited periods of time.

The liquid diet is used

i) to keep fecal matter in the colon at a minimum

ii) after surgery

iii) to replace fluids lost from vomiting or diarrhoea.

I) Fluid Diet Liquid diets may be clear- liquid or full liquid diet.

a) **Clear Fluid Diet:** This diet is made up of clear fluids that leave no residue, and it is non gas forming, non irritating and non stimulating to peristaltic action. This diet can meet the requirement of fluids and some minerals and can be given in 1 to 2 hour intervals and its use is typically limited to 24 to 36 hours. This diet is given during acute infection, following operations of colon or rectum,

diarrhoea and vomiting. The foods which can be included are barley water, dhal water, whey water, tea and coffee without milk.

b) **Full Fluid Diet:** This diet bridges the gap between the clear fluid and soft diet. In this diet, foods which are liquid or which readily become liquid on reaching the stomach are given. It is used following, operations, in acute gastritis, acute infections and in diarrhoea. This diet is given at 2 - 4 hours interval. The foods included are kanji, milk shakes, lassi and soup and is used only for limited periods of time. The liquid diet is used i) to keep fecal matter in the colon at a minimum ii) after surgery iii) to replace fluids lost from vomiting or diarrhoea. This diet is given at 2 - 4 hours interval.

ii) Soft Diet: It is used in acute infections, following surgery, and for patients who are unable to chew. The soft diet is made up of simple, easily digested food and contains no harsh Fiber and no rich seasoned food. In this diet, three meals with intermediate feedings should be given; Patients with dental problems are given mechanically soft diet. The foods include cooked dhals, double cooked cereals, custard, steamed bananas, purees.

iii) Mechanically Altered Diet: It differs from normal diet in texture and seasonings, depending on the needs of the patient. Mechanically altered diet is limited to soft food for those who have difficulty chewing food because of missing teeth or poorly fitting dentures. Eg. Puffed rice, gruels, purees, minced meat and desserts like custard.

iv) Fiber Restricted Diet: Fiber restricted diet has reduced Fiber content and is soft in consistency. It serves as a transition to a normal diet in fevers and in gastrointestinal disturbances.

v) Regular Diet: The regular diet is the most frequently used in hospitals. It should meet the RDA and include all food groups.

Modification of nutrients in therapeutic Diets

The general principles of nutrition related to health apply also to the treatment of patients suffering from various diseases. Diet in disease must be planned as part of the complete care of the patient many modifications may have to be made according to the disease and the condition of the patient, but there are certain general principles which may be used for guidance.

Principle of Therapeutic Diets

- Carbohydrates are usually well – tolerated and are necessary to maintain the stores of liver glycogen.
- The tolerance of fats varies in different individuals and this nutrient should not be forced if there is nausea and vomiting.
- In illness, there is usually an increased demand for proteins, due to wasting and this should be given in easily digestible forms such as milk, egg, chicken and fish.
- The requirements of calcium and iron must be maintained during illness and it is necessary to check.

- Fat soluble vitamins often need to be added as concentrates if a patient has to be on a fat – restricted diet for a long time. The demand for Vitamin C is greatly increased in fevers, and it is especially necessary for the healing of wound after surgery
- Roughage: Excessive bulk hinders the penetration of the digestive juice, but it may be necessary to include foods with a moderately high residue content to produce daily bowel action.
- Fluids are very important to prevent dehydration which is common in conditions of fevers, diarrhea and vomiting. In such condition 2,500 –3,000 ml must be given in 24 hours with as much variety as possible, both in appearance and in taste.

Many pathological conditions bring about changes in the body process which necessitate addition or omission of certain nutrients in the diet as part of the treatment. Some of the special diets served in the hospitals are:

High caloric or low caloric diet

High protein or low protein diet

Fat free diet

Low salt or salt free diet

Sippy's diet

Table 10: Principles of Diet for Various Disease Conditions

Disease condition	Dietary principle
Typhoid	A high calorie, high protein, high carbohydrate, low fat, high fluid, low Fiber and soft bland diet.
Tuberculosis	A high calorie, high protein, high vitamin, minerals, and high fluid diet is given.
Peptic ulcer	High energy, high protein, moderate fat and low Fiber
Diabetes	A high calorie, high protein, moderate fat, low Fiber, high fluid and low residue diet is recommended. Initially liquid diet followed by soft bland diet.
Constipation	Normal energy, protein and fat requirements are followed. Adequate fat may be given as it increases gastric motility by causing lubrication of mucous in the GI tract. High Fiber and plenty of fluid is recommended.
Hepatitis	A high protein, high carbohydrate and moderate fat diet is recommended. Small, attractive meals at regular intervals are better tolerated. Over feeding should be avoided.

Cirrhosis	A high calorie, high protein, high carbohydrate, moderate or restricted fat, high vitamin diet helps in the regeneration of liver and helps to prevent ascites. Vitamin supplementation is given. Sodium is restricted only when there is ascites.
Obesity	Low calorie, normal protein, vitamin and mineral (except sodium), restricted carbohydrates, restricted fat and liberal fluid, high Fiber diet.
Underweight	A high calorie, high protein, high carbohydrate, moderate fat diet with good sources of vitamins and minerals.
Atherosclerosis	Low to moderate calorie, moderate fat (less saturated fat, cholesterol and high in unsaturated fats such as monounsaturated fat and poly-unsaturated fatty acids) low carbohydrate, normal protein and high Fiber is recommended.
Hyper tension	Low calorie, low fat, low sodium diet with normal protein is prescribed.
Glomerulo nephritis	High energy, moderate protein, salt and fluid restricted diet is advised.

INTEXT QUESTIONS

I. SHORT QUESTIONS

1 Give the objectives of meal planning.

2 List the factors affecting meal planning.

3 What is RDA? Give its uses.

4. What is balanced diet, why is it important to consume balanced diet for various age groups?

5 . Define Therapeutic Diet. Add the reasons to modify the normal diet.

6. What are routine hospital diets?

7. Give any 2 examples of nutrient modification as per diseased condition?

II. ESSAY QUESTIONS

1. Explain the importance of balanced diets for various age groups?

2. List the factors to be considered while planning therapeutic diets ? Add a note on the various nutrient modification in Therapeutic diets?

III. ACTIVITY

Based on the nutrient modification and dietary principle given in the text. List the foods to be given in the text. List the foods to be given and avoided for the below mentioned diseased condition.

Disease Condition	**Foods to be given**	**Foods avoided**
Jaundice		
Obesity		
Hepatitis		
Typhoid		
Hypertension		
Peptic Ulcer		

UNIT - 3

FOOD SELECTION, PURCHASE AND STORAGE

Food selection, or food choice, is the study of the factors that influence the selection of foods for consumption

The types of food you select depend on the following factors and influence our selection or choice of food

- The money you have
- Your nutritional needs and
- The effect of advertisements

The money you have

The more money you have, the more foods you can buy and the greater will be your choice. People who have a lot of money can afford a variety of meals and can eat away from home. People with small incomes have a limited choice and it becomes a hard task to buy enough food to meet family needs.

If you have a limited food budget, you can save money by buying foods available during the season and buying cheaper cuts of meat as well as comparing prices in different shops

Likes and dislikes

You eat to keep alive and healthy. At the same time most people also eat to enjoy the food. People tend to eat foods they like and avoid those they dislike.

Is there any food you dislike? Why do you dislike it? Is this food very nutritious?

Foods are normally disliked because of their colour, flavour and texture also if they are new and have never been tried before.

They do not look attractive. The food is associated with some ill feeling due to the way it is cooked is not appealing

Food is enjoyed when it is liked. Food is enjoyed because it provides some sensations for you the aromas and flavours that come from food are detected by special nerves in the sense organs of taste and smell. Sight and temperature also have a great effect on the enjoyment of food. Cooking food often develops the flavour and changes the texture of food. Many foods are traditionally eaten hot or cold.

If food is too hot or too cold it may be uncomfortable to eat.

Advertisements

Another great influence on food selection/choice is advertisement. Advertisements have a way of persuading people to make choices. Food manufacturers and shops advertise their products through television, radio, magazines, newspapers, posters and leaflets.

Good adverts are decent, honest and truthful. They do not mislead the public about a product.

They show a sense of responsibility to people.

Points to be kept in mind when selecting/ purchasing some food commodities

- **Fruits and vegetables:** High quality fruits and vegetables are the ones that are ripe, crisp, fine and free from bruises. Nutrient values of fruits and vegetables decrease over a period therefore they should be purchased when fresh. Vegetables will usually wither when kept in the sun or kept for too long.
- **Starchy roots and plantain:** These foods form the staple food in many areas. They are relatively cheap but do not have good keeping quality. They can be used for a variety of food products. They are sold in fresh or dried and powdered forms. Examples of such foods are plantain, cassava, yam, water yam, potato and taro. When purchasing these foods care must be taken so that only good quality foods are bought. Roots should be free from bruises since this would make them rot quickly. They must be firm to touch. Softness in roots is a sign of spoilage. They must not start sprouting. Ripped plantain should not have black spots on the skin.

Animal and animal products: Foods in this group are very expensive and they spoil very quickly. The most expensive animal foods are not necessarily the most nutritious. If their source are limited one can still get good quality protein from cheap sources such as snails, crabs, sprats and anchovies. When buying animal foods; quality and safety are very important consideration.

The quality of animal products can be assessed as follows:-

- Meat should have a deep red colour with white or creamy fat.
- Signs of poor quality are very dark brown or green colour and yellow fat.
- When the meat is greenish and smells bad it is of poor quality and not safe for eating.
- Poultry should have a meaty body with meaty legs and breasts.
- The skin should not have any discoloration Fish should have firm flesh and shiny skin with a lot of tightly clinging scales.
- It must have bright and clear eyes and red shiny gills.
- Disagreeable colour, flesh that leaves a dent when pressed and dry skin are signs of spoilage.
- **Eggs:** Eggs may have white or brown shells. The nutritive value is the same. Eggs can be bought fresh or dried. When buying eggs, look for shells that are rough and not shiny. Test for freshness by putting it in a jar of salt water. When it floats the eggs is stale. Buy eggs that are clean and not cracked.
- **Milk:** Milk is sold in liquid or powdered form. The choice will depend on the purpose intended to use it. Milk can be bought fresh. Its keeping quality is not good especially outside the refrigerator. When milk tin is opened and used the remaining milk should be poured out of the tin and kept in the refrigerator or a cool dry place, well covered.
- **Legumes:** Legumes include groundnuts, cowpeas and soya beans. Legumes are sold shelled or unshelled. When buying legumes one must buy the ones that are not infested with weevils. Also they must not be mouldy

- **Cereals:** Cereals are normally sold in grains or in powdered form. When buying cereals avoid the ones that have weevils or have grown moulds. Mouldy cereals are not good for consumption. Inspect for colour, size and uniformity of grain and freedom from contamination, foreign matter and infestation. Coal-tar dyes, mineral oil and lathyrus sativus are common adulterants.
- **Spices** should be selected whole as far as possible. Size, colour ,shape and freedom from contamination, foreign matter and infestation should be considered. The ground spices/powders should be selected based on the certification mark.

  Fats and Oils: Reputed brands can be selected rather than loose oils which have chances of contamination.

Food Purchasing

What is food purchasing?

Food purchasing is the process of acquiring food items through the exchange of money.

Food purchasing can be a boring or interesting adventure depending on one's approach to it. To make food purchasing interesting you have to know much about the market place and ways in which you can make the most out of your food budget.

Now let us look at some of the things you can do to avoid waste of your time and money when purchasing food.

First of all you need to know the factors that determine the cost of the things you want to purchase. They are production cost, the market supply of goods, the demand of the goods, advertisements and amount of processing.

TABEL 11 : Food Purchase Chart

S.No	Types of Food	Shelf Life	Examples of Food Items	Frequency of Purchase
1	Perishable	Short life, 1-2 days, after spoil or decay	Meat, fish, poultry, dairy products, leafy vegetables and other vegetables	Daily basis
2	Semi perishable	Limited shelf life, a week	Potatoes , onions, garlic	Weekly basis
3	Non perishables	Long shelf life, more than a month	Cereals, pulses, flours, spices, canned foods, nuts, oils	Monthly basis

Factors that determine the amount of money we spend on food.

For most people food budget is one of the largest expenses. Careful planning and shopping can help in savings of the money. Normally if you are rich you tend to spend more money on food and if you are poor you spend less.

Money we spend on foods depends on

1. Personal preferences
2. One's lifestyle will determine their food selection and hence the money spent on them.
3. The skill of bargaining for example would help you to buy goods at the cheapest possible cost.
4. Buying foods in season and in bulk also helps to cut down cost.
5. Buying food from farm gates instead from retailers as it is cheeper. When you buy food, buy them from places where prices are lower and where food sold is of good quality. Buy food from places that are clean and where food is well stored.

Storage of Foods

"It is the process in which both cooked and raw materials are stored in appropriate conditions for future use without any spoilage".

Guidelines for storage of food

Clean, Cover and Dry

Importance of food storage

- Preserve wholesomeness of the food.
- Protect quality of the food ingredients.
- Maintain expected shelf life of the product.
- Reduce wastage and spoilage.
- Control temperature.
- Prevent food contamination.
- Ensure safe for consumption.
- Stabilize the price.
- Future use.
- Cope with demand, production on a continuous basis.

Various foods require different temperature conditions for storage

FOOD STORAGE

Storage Space: The proper storage of food after it has been received and checked is an important factor in the prevention and control of loss of waste. Depending upon the speed with which the food spoils, they are classified as perishable, semi-perishable and non-perishable, each type requiring different types of storage conditions.

There are basically two types of storage, dry storage and low temperature storage.

These are further subdivided according to the temperature required as Dry and Low Temperature Storage.

Dry Storage: As the name suggests, dry storage is a place for the storage of dry ingredients (usually stored at room temperature of 20 - 25°C). The storage should be dry, cool, well ventilated and free from infestation of any kind in order to maintain the food in good condition. The space for dry storage must be large enough to hold stocks for commodity for one to three months according to its frequency of use. Dry store rooms should be well lighted so that every item placed in them is easily visible and identifiable. Good ventilation helps to prevent spoilage and maintain the temperature required. Foods that need to be kept dry are usually stored in cabinets or store rooms. Cereals, canned foods packaged foods and other dry food items should be kept in cool dry and clean places in the kitchen.

Food should not be stored above refrigerator or cooker or near any heat outlet. The temperatures of these areas are warm and favorable for the growth of microorganisms. Storage areas must be kept clean by cleaning the spills as soon as they occur to avoid attracting insects.

Low Temperature Storage: The principle underlying the designing of low temperature storage is to maintain temperature at levels, which will inhibit the growth of microorganism, there by preserving the food. At high temperature, microbial activity gets accelerated because purchase and storage of perishable food have relatively high portion of moisture providing suitable humidity for spoilage to occur. There are three distinct types of low temperature storage based on different temperature range, maintained for the storage of semi perishable and perishable food. These include:

Refrigerated storage -3 to 11°C b) Cold storage- 0 to 3°C c) Freezer storage -–18 to –20°C

a) Refrigerated Storage: Refrigerated storage is a storage space planned and maintained at a temperature 3°C to 10°C. The quality of perishable food can be maintained here for 2 - 3 days only after which certain changes start taking place in food due to enzymatic or microbial activity. It is a good practice to keep food covered in refrigerator to prevent them from drying. This also prevents odour from one food being picked up by others. The shelves on the door are not as cold as inside. This area is good for storing eggs. The lower part of the refrigerator is also not very cold so vegetables can be stored there. Foods stored in the refrigerator must be covered well so that it would not dry out or absorb odours from other foods.

b) Cold Storage: Cold storage is generally one which the temperature is maintained between 0° and 3°C, thereby reducing the enzyme activity to a minimum. It is called "chill room" and can hold perishables for over a week, and in the case of fruits and vegetables, even up to a month depending on the stage of ripeness and variety.

c) Freezer Storage: In the freezer, storage temperature ranges from –18°C to –20°C. For successful freezing, it is necessary to blanch foods, cool quickly to freezing temperature and pack in air tight containers or bags in quantities which can be utilized immediately on thawing. A food removed from the freezer storage for use must never be partly or wholly kept back or refrozen, as there is a serious risk of microbial contamination. Frozen foods has to be kept with their original packages in the freezer. Foods to be frozen should be wrapped in moisture and vapour proof wrapping and arranged properly in the freezer.

After shopping for food, store frozen foods immediately in the freezer, so that they will not thaw completely. After this you can store other foods that need refrigeration like eggs. Wash fresh vegetables before

storing in the vegetable compartment of the refrigerator. Store yams, potatoes and onions in a cool dry place.

If fruits are not fully ripe they should be kept at room temperature until they are ripe. Then they can be put in the refrigerator. Do not store bananas in the refrigerator because they get darken and do not look attractive.

Canned and packaged foods should be placed in a cool and dry cupboard. When opened they must be refrigerated.

Food selection, purchase and storage require the use of many resources. The important ones are time, energy, money, storage facilities, knowledge and market. Foods stored properly are safe and last longer.

Table 12: Types of Foods and Temperature for Storage

Types of Food storage			
S.No	**Type of Storage**	**Foods to be stored**	**Temperature**
1	Dry Storage	Cereals, Flours, sugars, Spices, certain fruits and vegetables like Banana, Onion, potato etc	21^0C
2	Refrigerated storage	Fresh, Cooked or partially cooked foods (milk, Meat , Vegetables)	0-7^0C
3	Frozen Storage	Meat, Ice-cream, Butter, Cheese	-18^0C

Food fads and food fallacies

Food faddism refers to describe a particular food or food group that is popularized in the routine diet or is eliminated to cure a specific disease.

According to some researchers food faddism is an unhealthy practice and is often associated with eating disorders.

A food fad draws people's attention for a limited time. Adults might be affected by food fads, but children are particularly vulnerable. Food fads give health claims that are not supported by scientific evidence and people who adopt these food fads are in line with their beliefs. Misinformation about foods plays a role in practising food faddism. Fad diets can lead to nutritional shortages and may lead to other health issues, including a detrimental impact on hormone health and metabolism. Diets can have a negative impact on mental health by producing stress, guilt, and worry about food choices.

Food faddism may not preserve the balanced diet concept and may result in inadequacy, lack of variety/ food diversity and imbalance of foods.

Examples of Food Fads.

1. Eating 'Bhindi' (lady's finger) improves one's math skills.
2. There is no link between eating bhindi and performing well in math.
3. Brown eggs are preferable to white eggs. The nutrients in both types of eggs are not equal.

4. Fish is an excellent source of nutrients for the brain. It improves intellect. No fish is merely a source of protein. It has absolutely nothing to do with IQ.
5. Yoghurt, which is fermented milk, is termed as 'miracle food' and sold at an inflated price.
6. A current misconception concerns a new papaya type that contains nearly no seeds. According to legend, seedless papaya causes infertility.

Food fallacies are wrong opinions about the role of certain nutrients in the body. The increasing number of wrong opinions on foods and nutrients results in economic and nutritional exploitation of the public. There are many superstitions, prejudices, beliefs also found in relation to food which result in food fallacies and may be dangerous.

There is a large list of food and fallacies showing that there is a lot of ignorance and when liked with religion or family pattern of living it becomes more difficult to change them.

Some common food fallacies are listed here.

Peas, potatoes and beans cause constipation.

Milk should not be taken with fish.

Lemon aids digestion.

Fruit juice is more nutritious than a whole fruit.

Raw carrot improves vision drastically.

Mutton is better than chicken and fish.

Oranges cause cold when eaten during night.

Raw onion should be eaten.

Drinks like coffee, tea, soda syrups, juices etc do not contribute to weight gain.

INTEXT QUESTIONS

I. Short Questions:

1. At what temperature should the following foods be stored?

   a. Vegetables b.Yams c. Maize d. Meat
2. Which of the following food items would you store first after marketing, meat, egg and pepper?
3. Explain two factors that would determine the amount of money you spend on food.
4. How are foods classified based on their shelf life?
5. Give the examples of food fads and fallacies.
6. What are the various types of food storage temperatures?

II. Essay Questions:

1. Define food storage? Write the importance of food storage with examples?
2. Describe the frequency of purchase of foods with examples based on the shelf life?
3. Explain the factors that influence the choice /selection of foods?

III. Activity:

S.No	Food items purchased	Type of storage Dry/ Cold temperature storage	Quality of food is as desired Yes/No	Shelf life of the food (No of days it is stored since purchased)	Remarks

UNIT - 4
FOOD PREPARATION

Food preparation refers to the process of getting raw ingredients and making them ready for consumption. All the actions taken up are necessary to ensure that the food is safe for consumption or has the required flavor. Food preparation is a crucial activity since it ensures the following:

- Separation of the inedible parts of the food from the edible parts. This is enhanced through peeling, shelling, and husking.
- Improvement of food quality by various processes which include through grinding, soaking, and pounding to ease the chewing process and make it easily digestible,
- Destruction of micro organisms or detoxification whereby some food is made safe for consumption, such as cassava roots containing prussic acid, expelled by cooking and soaking.

Need for food cooking

Cooking is the process of producing safe and edible food by preparing and combining ingredients, and (in most cases) applying heat.

Cooking ensures food safety, increase digestibility and contributes to edibility by giving them the characteristics we associate with edible food,

Traditional food preparation involves many scientific principles. These include hand pounding, parboiling, soaking, sprouting, fermentation, malting, combination, parching and boiling.

Indian traditional food preparation is a culmination of science and art. Many scientific principles are involved in traditional food- processing and cooking methods.

Preliminary food preparations: Preliminary preparation includes process used in preparing your ingredients before cooking or food preparation stages.

The goal of preliminary preparation is to subject the food to various process that would save time and energy. The following steps should be followed before the actual cooking.

Washing/ Cleaning: Process of to remove dirt.

Peeling: Removing or scrapping off the skin of vegetables and fruits.

Cutting: Making into small pieces by knife (slicing, dicing, shredding etc.)

Mincing: Cutting/ Chopping into very small pieces like mutton/onion.

Shredding: Cutting into long narrow pieces for example cabbage.

Slicing: Cutting into thin pieces or slices.

Slitting: Cut in to uniform pieces or for example green chilies.

Grating: Reducing into small particles by rubbing on a rough surface.

Grinding: Reducing into small pieces but by crushing for example in masala.

Mashing: Breaking up of soft food by the application of pressure.

Pressing: Separating the liquid portion from solids for example cheese preparation.

Sieving: Passing through a fine wire mesh to remove dirt and impurities. It also helps to entrap air for example sieving of flour.

Refining: Freeing any material from impurities for example sugar.

Skimming: Removing the floating layer.

Rendering: Separating of fat of animals from their connective tissue by heat.

Evaporation and Reduction: Removal of water without the lid.

Sieving – Separation of coarse fibers and insects from the fine materials using a mesh (sieve)

Soaking: Immersing in water to make cooking faster and grinding easier.

METHODS OF COOKING

Cooking methods are divided into three categories

A) Moist Heat method

In moist heat cookery methods, liquid is used as a medium to cook the food.

Boiling -With this method of cooking, enough water is added to food and it is then cooked over the fire.

Simmering - cooking below the boiling point of water

Poaching - cooking food in water without fat

Blanching - Scalding vegetables in hot water for a short time followed by quick cooling

Steaming - Direct and Indirect Pressure Cooking

b) Dry Heat Method: In dry heat cooking methods, the food being cooked does not use water to cook the food

- **Grilling -** Grills that are inbuilt in stoves. In this method, the griller, which has a tray, is heated up and the food is placed on the grill tray to cook.
- **Roasting -** With roasting, direct heat is applied to the food. When heat is applied to the outer covering of the food; it seals it up thereby trapping all the juices inside the food. The action of direct heating, heats up the juices inside the food, which then cooks it.
- **Baking -** Baking method of cooking in Baking Oven the food is cooked using convection heating.
- **Deep frying**- The oil or fat is usually put into a deep pan and is heated to boiling point. Food is then put into the hot boiling oil and is cooked in that way.

- **Puffing**- Heating the grains or vegetables in a pressure chamber in the presence of steam

C) Combination methods

Braising- First the food is subjected to dry heat later to moist heat

D) Microwave cooking- Micro waves are used in cooking food

E) Solar Cooking- Solar heat is used for cooking (Sun drying)

The Effect of Cooking and Processing Methods on Nutrients

The method of cooking results in the changes in constituents of food

These include Denaturation of proteins which can result in unavailability of proteins due to heat and also destroys natural toxicants and anti nutritional factors in rice, wheat etc there by increasing the nutritional value of the food. Carbohydrates and sugars absorb water when heated in moist medium which make them swell and rupture there by increase the digestability. In lipids thermal and chemical changes occur. In Deep fat frying where oil is heated several times may be toxic due to the formation of peroxides in the oil .

Water soluble vitamins can leach into cooking water. This means some vitamin content is often lost through evaporation. Degradation will depend on the amount of heat applied.

Cooking can also make these vitamins more bioavailable. Conversely, it can also degrade these vitamins, ultimately reducing the overall content.

This group includes the B Vitamins and Vitamin C.

Vitamins that are the most unstable when cooked/processed and stored: Ascorbic Acid (vitamin C), Folic Acid (Vitamin B_9), Thiamine (Vitamin B_1),Vitamins that are more stable when cooked, processed or stored: Niacin (Vitamin B_3), Pantothenic acid (Vitamin B_5), Biotin (Vitamin B_7), Vitamin D and Vitamin K.

Fat soluble vitamins are also affected by cooking. They will not leach into cooking water, but can leach into fats such as olive oil or butter. These vitamins can degrade with cooking, but not as easily as water soluble vitamins do.

ENHANCING NUTRITIONAL VALUE OF FOODS

Many of the traditional processes like soaking, germination, fermenting are simple and cost effective methods which can be used at home and by industries for value addition and processing of foods.

Germination: It's a traditional method, also known as sprouting. the process involves soaking the grain or pulse in water and after they absorb water and swell they are wrapped in damp cloth . In 2 -3 days the sprouts start appearing. It's a non thermal process, it increase the digestibility and minimize the anti-nutritional factors, also increases the dietary Fiber and B-complex vitamins and Vitamin C.

Fermentation: In this process the starch or sugars are broken down by the enzymes produced by the microorganisms. The end products formed will be either lactic acid or alcohol. This process makes food nutritious, digestible and flavoured. The fermented foods contain various strains of bacteria which are good for the gut health.

Food Fortification:

This method is also known as food enrichment in which specific nutrients are added in higher levels than the original food provides. The food chosen to fortify should be widely used by population, should not alter or react with the other ingredients of the food and should be easily available and cost effective. Some common examples are iodized salt, Vitamin A and D in fats and oils.

Traditional Foods:

The use of particular food ingredients and food preparation methods has been passed on from one generation to the next and are nowadays referred to as "traditional foods".

Indian cuisine consists of a variety of regional and traditional cuisines native to India. Given the diversity in soil, climate, culture, ethnic groups, and occupations, these cuisines vary substantially and use locally available spices, herbs, vegetables, and fruits. They are rich sources of nutrients and phytochemicals.

Indian food is also heavily influenced by religion, in particular Hinduism and Islam, cultural choices and traditions. Traditional foods played a major role in traditions of different cultures and regions for thousands of years including foods that have been consumed locally and regionally for an extended time period. Regions at a lower altitude, for example, have different vegetation compared to regions at high altitudes; countries without access to the sea usually have a lower availability of fish and seafood compared to those with a large coastal area.

Preparation methods of traditional foods are part of the folklore of a country or a region.

Traditional food is a food with a specific feature or features which distinguish it clearly from other similar products of the same category in terms of the use of "traditional ingredients" (raw material of primary products) or "traditional composition" or "traditional type of production and /or processing method". Traditional foods developed a long time ago, and many of them still have their place in healthy diet today, whereas others may not meet nowadays nutritional needs because they are too high in energy or fat. So, it makes sense to modify the nutrient composition of some traditional foods to make them more appropriate for the 21st century.

Some Traditional Foods of India

- **Bengali Food:** The specialty of this food lies in the perfect blend of sweet and spicy flavours.
- **Gujarathi Food:** It is primarily vegetarian and has high nutritional value and different styles of cooking.
- **Kashmiri Food:** It has features of the cooking style like central Asia, Persia and Afghanistan.
- **South Indian Cuisine- [Karnataka, Maharastrain, Andhra, Tamilian, Keralian] :**

  The food is known for its light low calorie appetizing dishes. The traditional food is rice based. It has wide varieties of dishes.

Regional Foods

- Regional food/cuisine is cuisine based upon national, state or local regions. Regional cuisines may vary based upon food availability and trade, varying climates, cooking traditions and practices, and cultural differences. Moreover regional food/cuisine is based on the local grown food, hence based on agriculture.
- Regional food preparation traditions, customs and ingredients often combine to create dishes unique to a particular region.
- Indians eat by region and religion. Northern Indians eat more flat breads, while those from southern India prefer rice. The cooking style varies from region to region and is largely divided in to south Indian and north Indian cuisines
- India has four main food categories, Rajasthani, Gujarati, Maharashtrian and Goan. Maharashtrian cuisine has two important areas that are separated geographically. Coastal regions are more popular with rice fish and coconut. However the mountainous regions are more consistent with wheat, jowar, and baji. Goan are heavily dependent on rice, coconut and fish. Gujarati is very vegetarian and has more sweets. Rajasthani is also very vegetarian, but has a very well blend of spices and herbs.
- West India might also be the most diverse out of all the four categories of India. Usually vegetarian, west India also has a nice balance of spice, herb and meats.
- Eastern India uses a simpler way of preparing and serving a meal. Steaming and frying are typical ways that basic foods are cooked. Meat is one of the popular food material in East India.
- South India Samber can be found at other places, such as Andhra, Chettinad, Hyderabadi.Fine desserts also are created throughout Southern India. Desserts like mysore pak (chick pea dish) and creamy payasam (milky rice dish). Chettinad dish Payasam
- Northern India meal is made up of dairy products, such as yogurt, milk, paneer, ghee,(butter). In addition, gravies decorate food and are usually dairy based. Sometimes some meals have nuts, spices and herbs added.
- Maharashtra: Misal Pav.
- Punjab: Makki Ki Roti & Sarson Ka Saag.
- West Bengal: Kosha Mangsho.
- Gujarat: Dhokla.
- Kashmir: Rogan Josh.
- Tamil Nadu: Pongal.
- Assam: Papaya Khar.
- Bihar: Litti Chowkha

INTEXT QUESTIONS

I. Short questions:

1. Give the importance of cooking .
2. What are the traditional and regional foods in India?
3. Write the various ways used to enhance the nutritive value of foods.

I. Essay Questions:

1. Describe the methods of cooking and add a note on the effect of cooking on the food components.

II. Activity based:

1. List the dishes you ate today in the meal (Breakfast/ lunch/Dinner).
2. Identify the above dishes with the method of cooking.

UNIT - 5

ASSESSMENT OF NUTRITIONAL STATUS

Nutritional status has been defined as an individual's health condition as it is influenced by the intake and utilization of nutrients.

> Nutritional assessment is the systematic process of collecting and interpreting information in order to make decisions about the nature and cause of nutrition related health issues that affect an individual.

It involves the interpretation of anthropometric, biochemical (laboratory), clinical and dietary data to determine whether a person or groups of people are well nourished or malnourished (over-nourished or under-nourished).

Nutrition is a critical part of health and development. Better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non-communicable diseases (such as diabetes and cardiovascular disease) and longevity.

Nutritional status is directly affected by the foods we eat and their nutrient content. Good nutritional status depends on eating the right amounts and the right variety of safe, good quality foods to meet our individual nutritional needs.

Malnutrition – Types

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients.

Malnutrition covers two different categories of conditions that are given below

1. Under nutrition – This category covers stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies (lack of important minerals)
2. Over Nutrition – This category consists of overweight, obesity, diet-related non-communicable diseases (such as heart disease, stroke, diabetes, and cancer)

Malnutrition – Negative Impacts

1. Affects the productivity of the population
2. Affects the country's mortality rates
3. Affects the survival rate of children
4. Affects the learning capability of children

Malnutrition – Causes

Many families cannot afford nor have access to

1. Fresh fruits
2. Vegetables
3. Legumes

4. Meat

5. Milk

The reason behind the rapid rise in obesity in adults and children is the cheaply available foods and drinks high in fat, sugar, and salt. Overweight problem is prevalent in poor as well as rich countries.

There are many reasons that cause malnutrition in India. The Fundamental Causes behind Malnutrition in India are:

Poverty

Hygiene

Socio-cultural factors

Malnutrition is an ecological problem that does not occur alone. It accompanies poverty, disturbed family structure, ignorance and despair.

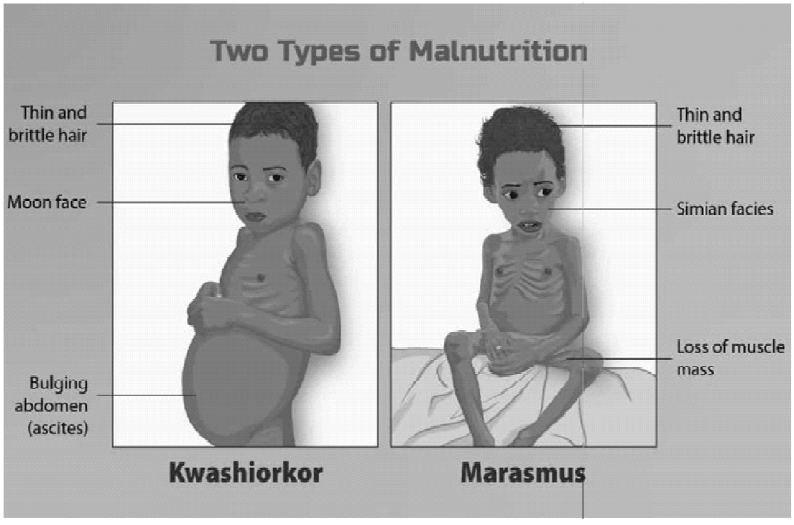
Because of low purchasing power, poor cannot afford to buy desired amount and desired quality of food for the family. This adversely affects their capacity for physical work and they earn less. Thus starts a vicious cycle of poverty, under nutrition, diminished work capacity, low earning and poverty.

Lack of awareness of nutritional qualities of food, irrational beliefs about food, inappropriate child rearing and feeding habits all lead to under nutrition in the family.

Infections like malaria and measles or recurrent attacks of diarrhea may precipitate acute malnutrition and aggravate the existing nutritional deficit.

Metabolic demands for protein are higher during infections and the child may take in less food either due to reduced appetite or due to food restrictions by the mother. Thus leading to malnutrition.

Girls receive less food than the economically active male member. Large families where per capita availability of food is also less. Poor quality of housing, sanitation and water supply cause ill health and infections thus contributing to malnutrition and inadequate maternal and child care.



The causes and consequences of malnutrition are complex, and it will require the concerted efforts of all social institutions, including the social work profession, to combat malnutrition effectively.

Steps taken by Government for Nutritional Well Being

- **POSHAN Abhiyaan or National Nutrition Mission:** It is Government of India's flagship programme to improve nutritional outcomes for children, pregnant women and lactating mothers.
- **Anemia Mukt Bharat (AMB):** Strategy was launched in 2018 with efforts to improve Iron and Folic Acid (IFA) supplementation, behaviour change and anaemia-related care and treatment across six target groups including pregnant women, lactating mothers, and children.
- **Integrated Child Development Scheme (ICDS):** It aims to improve the nutritional and health status of children in the age-group 0-6 years and reduce the incidence of mortality, morbidity, malnutrition and school dropout.
- **Public Distribution System:** It provides coverage to upto 75% of rural population and upto 50% of urban population for receiving highly subsidized food grains under Targeted Public Distribution System.
- **Midday Meal Scheme:** Mid Day Meal Scheme is a school meal programme is designed to better the nutritional stranding of school-age children nationwide. The scheme has been renmed as POSHAN Secheme.

Solution to the problem of malnutrition (In brief) – Increasing yields by organic manuring and mixed cropping; devoting more land to staple food production; changes in food habits and in food technology.

Meals for all school children studying in Classes I-VIII of Government, Government-Aided Schools.

Assessment of nutritional status can be carried out by two methods -

- Direct Methods of Nutritional Assessment
- Indirect Methods of Nutritional Assessment

Direct Methods of Nutritional Assessment

The direct methods deal with the individual and measure objective criteria.

These are

1. Dietary evaluation methods
2. Anthropometric methods
3. Clinical methods

4. Biochemical, laboratory methods

Indirect Methods of Nutritional Assessment

The indirect methods use community health indices that reflect nutritional influences. These include three categories Ecological variables, Economic factors and Vital health statistics.

Dietary evaluation methods

In this method nutritional intake of humans is assessed by different methods, which differ according to the level at which the assessment is being carried out, whether national, institutional or household.

1. **National level:**
    - Food balance sheet
    - Food disappearance
    - Commodity report
2. **Institutional level:**
    - Inventory method
    - Actual weighment method
3. **Household level:**
    - 24 hours dietary recall
    - Food frequency questionnaire

Limitations:

- Long Questionnaire
- Errors in estimating serving size

Needs updating with new commercial food products to keep pace with

- Changing dietary habits
- Dietary history since early life
- Food diary technique

Observed food consumption

Anthropometric Methods

- Anthropometry is the measurement of body height, weight & proportions.
- It is an essential component of clinical examination of infants, children & pregnant women.
- It is used to evaluate both under & over nutrition.
- The measured values reflect the current nutritional status but do not help to differentiate between acute & chronic changes.

Anthropometry for Children

- Accurate measurement of height and weight is essential. The results can then be used to evaluate the physical growth of the child.
- **Height:** The growth rate of children is influenced by the state of nutrition. The body length of an infant should be determined by making the child lie flat on a table fitted with length measuring device. Above 3 years the height may be determined as the child will be able to stand erect for correct measurement of the height.
- **Weight:** Weight is the simplest measurement of growth and nutritional status. Weight for children can be expressed in terms of percentages in various percentiles of standards or as percentages of standard weight as suggested by Gomez (1957). The weighing machine used for measuring the weights of young children should be accurate and reliable.
- Growth monitoring in infants and children can be done by plotting the data on growth charts over a period of time that will help to calculate growth velocity, which can then be compared to standards.
- Gomez's classification: Gomez (1957) suggested that low body weight could be used as an index of malnutrition in children, as follows:

  (Actual weight/ Standard Wt) 100
- >90% Std weight /age -Normal
- 90-75% Std weight/age –Grade I or Mild malnutrition
- 75-60% Std weight/age –Grade II or Moderate malnutrition
- <60% Std weight/age –Grade III or Severe malnutrition

Table 13 : Mid-arm circumference (MAC)to Assess Nutritional Status

Level of severity/Nutritional status	MAC cut off points
severe malnutrition	<110 mm
moderate malnutrition	110 -120 mm
serious risk of malnutrition	120 -125 mm
moderate risk of malnutrition	125 -135 mm
satisfactory nutritional status	>135 mm

- **Skin fold thickness**

  Skin fold thickness is usually measured on the back of the arm, over the triceps muscle midway between the tip of shoulder and the elbow.

  Various types of skin-fold calipers are available. The caliper should have standard contact surface or pinch area of 20-40mm, should read to 0.1mm accuracy and exert a constant pressure of

10gm/mm2 throughout the whole range of skin fold thickness at all distances of separation of the jaws.

- Head circumference (HC)
- Head/chest ratio
- <1 ---------- Mal nutrition
- >1 ---------- Normal

Nutritional Indices in adults

- **BMI is computed using the following formula:**

  BMI = Weight (kg)/ Height (m^2)

Table 14: BMI Cut Off

Nutritional status	BMI
Severe energy deficiency	<16
Moderate energy deficiency	16-17
Marginal energy deficiency	17-18.4
Normal	18.5-24.5
Overweight (grade 1 obesity)	25-30
Obese (grade 2 obesity)	>30-40
Very obese (morbid or grade 3 obesity)	>40

Waist/Hip Ratio (WHR)

- High risk WHR= >0.80 for females &>0.95 for males. Waist measurement >80% of hip measurement for women and >95% for men indicates central (upper body) obesity and is considered high risk for diabetes & CVS disorders.

Waist circumference

- Waist circumference predicts mortality better than any other anthropometric measurement.
- It has been proposed that waist measurement alone can be used to assess obesity, and two levels of risk have been identified

	Males	Female
Level 1	> 94cm	> 80cm- maximum acceptable
Level 2	> 102cm	> 88cm- obesity and requires weight management

Advantages of Anthropometry

- Objective with high specificity and sensitivity.
- Measures many variables of nutritional significance (Ht, Wt, MAC, HC, skin fold thickness, waist & hip ratio & BMI).
- Readings are numerical and gradable on standard growth charts.
- Readings are reproducible.
- Non-expensive and need minimal training.

Clinical method

- An essential feature of all nutritional surveys.
- Simple & most practical method of ascertaining the nutritional status of a group of individuals.
- It utilizes a number of physical signs, (specific & non specific), that are known to be associated with malnutrition and deficiency of vitamins and micronutrients.
- Good nutritional history can be obtained.
- General clinical examination, with special attention to organs like hair, angles of the mouth, gums, nails, skin, eyes, tongue, muscles, bones, & thyroid gland.
- Detection of relevant signs helps in establishing the nutritional diagnosis.

Advantages

- Fast & easy to perform.
- Inexpensive.
- Non-invasive.

Clinical examination is the most important part of nutritional assessment. It provides direct information of the signs and symptoms of dietary deficiencies prevalent among the people. The Indian Council of Medical Research (ICMR) has evolved a score card for assessing the various clinical signs and symptoms. This score card has been widely used in India in all nutrition surveys and has proved useful in assessing the improvement in nutritional status brought about by food supplements.

Table: 15 : Clinical Signs of Nutritional Deficiency

	Symptoms	**Deficiency due to**
Hair	Sparse & thin	Protein, Zinc, Biotin
	Easy to pull out	Protein
	Corkscrew coiled hair	Vit C & A
Mouth	Glossitis	B- Complex
	Bleeding & spongy gums	Vit C,K & A Folic Acid & Niacin
	Angular stomatitis, Cheilosis & Fissured tongue	B2,B6 & niacin
	Sour mouth & tongue	Vit B_{12}, B_6, C, Niacin, Folic Acid & Iron
Eyes	Night blindness, xerophthalmia	Vitamin A
	Photophobia-blurring, conjunctival inflammation	Vit B_2 and Vit A
Nails	Spooning (koilonychia)	Iron
	Transverse lines	Protein
Skin	Pallor	Folic Acid, Iron, B_{12}
	Follicular hyperkeratosis	Vitamin B & Vitamin C
	Flaking dermatitis	PEM, Vit B_2, vitamin A, Zinc & Niacin
	Pigmentation, desquamation	Niacin & PEM

Biochemical Methods

Biochemical methods involve estimating the level of the nutrient in blood or urine. These methods yield reliable data regarding the nutritional status of the individual with respect to the specific nutrient estimated. Biochemical studies which have been used in nutrition surveys are listed in Table 15.

Advantages of Biochemical Method

- Useful in the detection of early changes in body metabolism & nutrition before the appearance of overt clinical signs.
- Precise, accurate and reproducible.
- Useful to validate data obtained from dietary methods for example comparing salt intake with 24-hour urinary excretion.

Limitations of Biochemical Method

- Time consuming

- Expensive.
- Cannot be applied on large scale.
- Needs trained personnel & facilities.

Table: 16 Biochemical Parameters Suitable For Assessment in Nutrition Surveys

SNo	Nutrient deficiency	Constituents in blood	Constituents in urine
1	Protein	Total serum protein Serum albumin	Total urea, Total creatinine Hydroxyproline.
2	Vitamin A	Serum vitamin A Serum carotene	---
3	Vitamin D	Serum inorganic P Serum alkaline phosphatase in infants and weaned infants.	---
4	Ascorbic acid/vit C	Serum ascorbic acid W.B.C ascorbic acid	Urinary ascorbic acid Load test
5	Thiamine	R.B.C transketolase activity Blood pyruvate	Urinary Thiamine Load test
6	Riboflavin	R.B.C. riboflavin	Riboflavin in urine
7	Niacin	---	Load test /urinary excretion of N-methyl nicotinamide pyridine, load test
8	Iron	Haemoglobin in blood Serum iron	
9	Iodine	Protein bound iodine	Urinary iodine

Nutritional Deficiency Disorders:

Deficiency diseases are caused due to insufficient quantity of one or more nutrients in the body. This deficiency leads to weakness and vulnerability to infection in a person.

1. Protein-energy malnutrition (PEM) is caused by a deficiency of proteins, carbohydrates, and fats.
2. Children in the age group of 1-5 years are at risk mostly as they have retarded growth of height and weight.
3. PEM is mainly evident as Kwashiorkor and marasmus diseases.

   Kwashiorkor is a deficiency disease caused due to the lack of proteins in the diet of children during the infant stage and early childhood. The commonly observed symptoms are swollen feet (odema) lean legs, protruding abdomen, hair loss, stunted growth, diarrhea, and slow mental development.

5. **Marasmus** develops in children less than one-year-old due to the deficiency of proteins and carbohydrates in the diet. This disease is characterized by wrinkling dried skin, protruding ribs, mental retardation and no Odema.

Vitamin deficiency:

Vitamins are nutrients required for the proper functioning of the body. Deficiency of vitamins leads to impairment of fighting capabilities against diseases, weakness in the body, and lethargy.

1. Deficiency of vitamin A in the diet causes night blindness.
2. Deficiency of vitamin B_1 in the diet causes beriberi.
3. Deficiency of vitamins B_{12} in the diet causes anemia.
4. Deficiency of vitamin C in the diet causes scurvy.
5. Deficiency of vitamin D in the diet causes rickets.
6. Deficiency of vitamin E in the diet.
7. Deficiency of vitamin K in the diet leads to excessive bleeding.

Minerals deficiency:

Minerals promote the growth and development of the body.

1. Deficiency of calcium in a balanced diet leads to rickets in children. It causes the bone and tooth decay.
2. Deficiency of sodium and potassium in daily diet can ultimately lead to body muscle weakness and paralysis.
3. Deficiency of phosphorus leads to bone and teeth diseases.
4. Iron deficiency in the diet causes anemia.
5. Deficiency of iodine in the diet can lead to goiter.
6. Deficiency of fluorine leads to dental decay.

The measures to prevent malnutrition can be stratified at national, community and family level. Promotion of education and literacy in the community with special focus on health and nutrition, exclusive breastfeeding for first 6 months, introduction of complementary foods at 6 months and periodic growth monitoring on growth chart should be done vigorously as measures at all levels.

There are many programmes related to prevention of malnutrition in India.

17. Nutritional Programme in India

Nutrition Programmes in India	Nutrition Programme Ministry
• Vitamin A Prophylaxis Programme	Ministry of Health and Family Welfare
• Prophylaxis against Nutritional Anemia	Ministry of Health and Family Welfare
• Special Nutrition Programme	Ministry of Social Welfare
• Balwadi Nutrition Programme	Ministry of Social Welfare
• Integrated Child Development Service	Ministry of Social Welfare
• Mid-day Meal Scheme	Ministry of Human Resource Development
• Iodine Deficiency Disorders Control	Ministry of Health and FamilyWelfare Programme

INTEXT QUESTIONS

I. Short Questions

1. Define malnutrition? What are its types?
2. What are the causes of Malnutrition?
3. Write the effects of malnutrition
4. Give the steps taken by the government for Nutritional wellbeing

II. Essay Questions

1. What are the direct methods of assessment of nutritional status? Explain
2. Describe the various nutritional deficiency disorders?
3. What are the national nutritional programmes?

III. Activity

Record the heights and weights of 10 male and 10 female subjects and

Calculate the BMI

S.No	Participant	Gender age	Height (meters)	Weight (Kg)	BMI (Ht in kg/ Wt in m^2)

MODULE - II
GROWTH AND DEVELOPMENT

INTRODUCITON TO GROWTH AND DEVELOPMENT

Growth is defined as the fundamental characteristic of every living organism.

In the context of human development, growth is defined as an irreversible constant increase in size. It includes changes in terms of height, weight, body proportions and general physical appearance.

While the Development is a continuous and gradual process through which physical, emotional and intellectual changes occur.

Stages of life cycle

1. Fetal stage: Conception to birth
2. Infancy: From birth to I year.
3. Early Childhood :(one to five years of age)
4. Middle childhood : (six to twelve years age)
5. Adolescence or teenage (from 13 to 18 years age)
6. Early Adult hood – 20- 40 years
7. Middle age – 40 -60 years
8. Old age – 60 years and above

Patterns of Development

Development refers to both qualitative and quantitative changes. It is influenced by heredity and environment.

Development follows a direction and uniform pattern in an orderly manner. Hence it is a scientific process which has a practical value .it may also be defines as a progressive series of orderly coherent changes. Progressive means the changes are directional and leads forward rather than a backward direction.

(i) Development proceeds from the center of the body to outward. This is the principle of proximodistal development that describes the direction of development (from nearer to far apart). It means that the spinal cord develops before outer parts of the body. The child's arms develop before the hands and the hands and feet develop before the fingers and toes.

(ii) Development proceeds from the head downwards. This is called the cephalocaudal principle. According to this principle, development occurs from head to tail. The

child gains control of the head first, then the arms and then the legs.

Development process is scientific and has practical value.

There are five areas of human development:

Physical Development: It refers to the changes in size, shape, and physical maturity of the body, including physical abilities and coordination.

Cognitive Development: Refers to the learning and use of language; the ability to reason, problem-solve, and organize ideas; it is related to the physical growth of the brain.

Social Development: It is the process of gaining the knowledge and skills needed to interact successfully with others.

Emotional Development: It relates to the development of feelings and emotional responses to events; changes in understanding one's own feelings and appropriate forms of expressing them.

Moral Development: It includes the understanding of right and wrong, and the change in behavior caused by that understanding; sometimes called a conscience.

Development Milestones:

0-2 years - the child begins to interact with the environment.

2-6 years - the child begins to represent the world symbolically.

7-11 years - the child learns rules

12- 20 years - The adolescent can transcend, concentrate situations and think about the future.

INTEXT QUESTIONS

I. Short questions:

1. Differentiate between the growth and development
2. List the various stages of human life span

II. Essay Questions:

1. Describe the various stages of Development

III. Activity

Conduct the survey of 10 families and record the number of people in each stage of human life cycle.

Age group	No. (Number of people)	Male/Female
Infants		
1-5 years		
6-12 years		
13-18 years		
20-40 years		
40-60 years		
60 years		

UNIT - 6

EARLY CHILD CARE: (0-5 YEARS)

GROWTH AND DEVELOPMENT IN EARLY CHILDHOOD:

Early child hood development involves the skills and milestones that children are expected to acquire by the age of 5 years. Milestones like how to run, how to talk and how to play etc. Infant is born with limited range of skills and abilities, while during the early childhood a range of physical, cognitive, social and emotional development occur.

Early Childhood Development (ECD) is a period of rapid physical, mental, emotional, and social and language development. To achieve this critical development adequate nutrition, good health care, protection, play and early education are vital during this stage.

Physical Development: it includes physical growth from birth to adulthood and includes both gross motor and fine motor control of the body.

The child's control on the body includes control over muscles, physical coordination ability to sit and stand.

Table 18 : Milestones of Physical Development:

1 month	Hold head up
2 months	Raise up the chest with arm support
3 months	Roll over and reaches out to the objects
4 months	Sit up with support
5 months	Sits on lap and grasps given objects
6 months	Sits in chair with back rest
7 months	Sits without support
8 months	Tries to crawl
9 months	Stands up using support
10 months	Crawls
11 months	Walks with support
12months	Walks without support
1-2 years	Walk freely
2-4 years	Walk on tip toe
4-5 years	Leaps, jumps and swings
5-6 years	Can catch objects thrown from a distance

The growth rate of height and weight is slow and steady compared to infancy.

The average preschooler can gain up to 2.5- 3 kg annually until the age of 6. Gain in height decreases. Muscle and bone tissue is gained while the fat is lost.

Gain in height decreases during the preschooler years. Children grow 2-3" in height per year. Growth is concentrated in legs and arms.

Girls are slightly shorter than boys until the age of 11 years. After which girls are taller than boys for a while.

The growth of the child makes the softer skeleton to harder and less flexible structure due to ossification. This ossification for different body parts happens at different rate.

Preschoolers have more mobility than infants. Preschooler look slender due to less body fat Boys have more muscles and bones than girls.

Body system slows down and stabilize during early childhood. The child's metabolic rate, heart rate and respiration rate are all slower than they were in infancy. Activity level also decrease.

Baby Teeth are seen around 20 by the age of 3 years.

Stomach capacity is half that of the adult bladder control improves.

Brain grows up to 80- 90 % of adult capacity by the age of 5 years.

Motor Development: Gross motor skills continue the development which includes running, climbing, jumping etc and become steady as they grow. Fine motor activity such as drawing skills or cutting is accomplished.

Cognitive Development: it is the process of acquiring knowledge, ability to learn and solve problems. It involves change in the child's thought, perception, intelligence, reasoning, memory and language.

Table 19 : Language Development

Language Development	**The milestones are as follows :**
Age	**Milestone**
1 month	Alerts to sound
3 months	Coos (musical vowel sounds)
4 months	Laugh loud
6 months	Monosyllables (ba, da, pa) sound
9 months	Bisyllables (mama, baba, dada) sound
12 months	1-2 words with meaning
18 months	8 -10 words vocabulary
2 years	2-3 word sentences, uses pronouns "I", "Me", "you"
3 years	Ask Question
4 years	Says songs or poem, tell stories
5 years	Asks meaning of words

Social and emotional development of the child is a process where in the child understand, express and manage their emotions in the early years. It includes personal reactions to his own social and cultural situations with neuromotor maturity and environment stimulation. It is related to interpersonal and social skill as social smile, recognition of mother, use of toys.

Table 20: Social And Adaptive Milestones

Age	Milestone
2 months	Social Smile
3 months	Recognize mother
6 months	recognize strangers
9 months	Waves "bye bye" 1
12 months	comes when called, plays simple ball game
15 months	Jargon
18 months	Copies parents in tasks
2 years	Asks for food, drink, toilet
3 years	Shares toys, knows full name and gender
4 years	plays cooperatively in a group, goes to toilet alone.
5 years	helps in household tasks, dressing and undressing

Factors affecting Growth and Development:

Child's development is strongly influences by various factors. These influence the child in both positive and negative ways, which either enhance the development or compromise the development. These factors may be categorized as Biological factors (Nature) and Environmental factors (Nurture).

The biological factors include heredity,/genetics, nutrition and gender.

Heredity/Genetics: Heredity is the transmission of physical characteristics from parents to children through their genes. Genes affect height, weight, colour of the eye etc while genetic diseases like obesity, diabetes also affect the child's development adversely.

Gender: This affects the physical growth and development of a child. Boys and girls grow in different ways, especially during puberty. Boys tend to be different from girls physique, voice, maturity and behavior.

Hormones: Hormone secretion is critical for normal physical growth and development in children. Imbalances in the functioning of hormone-secreting glands may result in growth defects, obesity, behavioral problems and other diseases.

Nutrition: A balanced diet is essential for the development of the brain and body. A diet deficient in essential nutrients will restrict the growth and development of the children.

Environmental Factors: The environment plays a critical role in the development of children and is the sum total of physical and psychological stimulation the child. Some of the environmental factors influencing early childhood development involve the physical surroundings, geographical conditions, education and socio-economic status, culture and the family set up .

Geographical Influences: The community where the child lives in has a great influence in developing the child's skills, talents, and behavior.

Socio-Economic Status: The socio-economic status of a family determines the quality of the opportunity a child gets. The social links their family has, the neighborhood they live in, the opportunities offered by the community and their peer circles are some of the social factors which affects the child's development.

Cultures: Some of the cultures favors aggressiveness and competition while others play cooperation and submissiveness, and these traits play a very vital role on the child.

Education:

Good Education helps the child to build strong social and interpersonal skills. This will, of course, be different for children who don't have access to it.

The Perspectives of Physical Development:

Physical Development carries two key perspectives, nature and nurture. Both perspectives can be supported in many mays.

Gessell was one of the first theorists to identify developmental milestones – he called them 'Gessell developmental schedules. He developed the maturational theory, which suggests that children's development is due to their biological makeup and that environment has only a small influence.

Friedrich Froebel was a German scholar worked on child's play and how children use nature in their development. He stressed the importance of play and recognised that the outdoor environment is vital to children's learning and development. Each child should be allowed the time and space to play and develop through play activities.

Maria Montessori believed that children learn best through using their hands. She felt that one of the main factors that contributed to the child's development was the 'prepared' environment. Children learn through exploration and the adult's role is to create an environment where they can do.

The Perspectives of Social Development:

Sociological perspectives of childhood are theories that examine structural elements of the society the child lives in, and the background of the child, e.g. gender, ethnicity, and culture. Such theories can help us explain why and how children have such different experiences throughout their childhoods. These are important because children come in a variety of ages, genders, and ethnicities and experience different socioeconomic circumstances and include the functionalist and Marxist perspectives. They consider the role of the family as well as childhood.

One key sociological perspective is the social construction of childhood. This refers to the notion that childhood is not part of natural human development.

Sociologists argue that childhood is disappearing due to children being exposed to age-inappropriate things. Others argue that childhood is now toxic due to television, junk food, and other factors.

Infant Weaning: Weaning is the process of introduction of semi liquid to semi solid foods other than breast milk.

Initially liquids, then semi solids and gradually solids are introduced.

Once solids are introduced from around 6 months the child should be given more textures and tastes from around 7 months and progress to wider variety and family food from around 9-12 months.

They should be fresh, clean and hygienic and easily prepared at home. They should be easily digestible, acceptable and nutritious and the foods which are given to the infant in addition to breast milk are called complementary or supplementary foods.

Supplementary Foods: WHO recommends that infants start receiving complementary foods at 6 months of age in addition to breast milk. Initially, they should receive these foods 2–3 times a day between 6–8 months and increase to 3–4 times daily between 9–11 months and 12–24 months.

Types of Supplementary foods

1. Liquid supplements:

Milk, Fresh fruit juice and Soup from green leafy vegetables

Initially strained and later unstrained

2. Solid supplements mashed: Mashed food is given around 7th - 9th months of life. Cereal and starchy gruels, Vegetables, Fruits, Non-vegetarian, Pulses.

3. Solid supplements un mashed: foods like idli, upma, bread, chapathi, rice etc

INTEXT QUESTIONS

I. Short Questions

1. Write the milestones of physical development in early childhood.
2. Write the perspectives of physical development.
3. What are the perspectives of Social development ?
4. What is weaning? Why do you feel it is important?
5. List the types of supplementary foods introduced to the child.
6. Give the importance of few supplementary foods given to the child with examples

II. Essay Questions

1. What are the factors affecting the development in early childhood?
2. Discuss the milestones of various aspects of early child development

II. Activity

Observe about 10 children of different ages of early child hood years in your neighborhood and record their various developmental aspects.

S.No	Age in months	Physical development Characteristics	Language development Characteristics	Cognitive development Characteristics	Social development Characteristics

UNIT - 7

CARE OF SCHOOL AGED CHILDREN (6-11YEARS)

During the developmental period of school age child (between 6-12 years) the changes such as specific abilities, characteristics, or behaviour patterns appear. The school-age years bring new and exciting challenges and rewards for children. Children use feedback from important adults, peers and by their self-evaluation to judge their competencies.

School-age children's style of thinking is concrete, which means that their thinking and reasoning is more logical and organized than it was during the preschool years. For example, school-aged children can classify objects in different ways (such as grouping animals into birds, mammals, reptiles, playing position, etc.) Furthermore, children are able to understand and express a variety of emotions. Friendships among school-age children blossom, as they become better able to take the perspective of others.

Adults play an important role in helping school-age children develop a sense of personal competence. The child's sense of self and help encourage his or her self-esteem by:

- Offering praise and reinforcement.
- Helping a child to recognize his or her own unique talents and abilities.

A child's social and emotional development can be enhanced by encouraging the child to talk about his or her feelings and helping him or her develop problem-solving skills to use in friendships and other peer relationships. This guide offers general knowledge about children's development during the school-age years, including

- Thinking and learning
- Awareness of self and others
- Communication

Physical and Mental Development

School-age children most often have smooth and strong motor skills. However, their coordination (especially eye-hand), endurance, balance, and physical abilities vary.

Fine motor skills may also vary widely. These skills can affect a child's ability to write neatly, dress appropriately, and perform certain chores, such as making beds or doing dishes.

There will be big differences in height, weight, and build among children of this age range. It is important to remember that genetic background, as well as nutrition and exercise, may affect a child's growth.

A sense of body image begins developing around age 6. Sedentary habits in school-age children are linked to a risk for obesity and heart disease in adults. Children in this age group should get at least 1 hour of physical activity per day.

There can also be a big difference in the age at which children begin to develop secondary sexual characteristics. For girls, secondary sex characteristics include:

- Breast development

- Underarm and pubic hair growth

For boys, they include:

- Growth of underarm, chest, and pubic hair
- Growth of testicles and penis

By Five years, most children are ready to start learning in a school setting. The first few years focus on learning the fundamentals.

In third grade, the focus becomes more complex. Reading becomes more about the content than identifying letters and words.

An ability to pay attention is important for success both at school and at home. A 6-year-old should be able to focus on a task for at least 15 minutes. By age 9, a child should be able to focus attention for about an hour.

It is important for the child to learn how to deal with failure or frustration without losing self-esteem. The primary job of the school-age child is to develop a sense of personal competence. This means that children establish a sense of self or self-concept based on their abilities. This self-concept is influenced by how easily they learn new skills.

Milestones of physical development in school age years.

6-8 Years

- Strong motor skills, but balance and endurance can vary
- Sense of body image begins to develop
- Can use scissors and small tools
- Can tie their shoelaces
- May begin writing in print and cursive
- Develops a quicker reaction time

9-12 Years

- Becomes more aware of his or her body as puberty approaches; body image develops
- Develops secondary sex characteristics like breasts and body hair
- Enjoy active play, such as bike-riding, swimming, and running games
- Becomes interested in team sports
- Gets dressed, brushes hair, brushes teeth, and gets ready without any help
- Uses simple tools, such as a hammer, by themselves
- Likes to draw, paint, make jewellery, build models, or do other activities that use their fine motor skills

LANGUAGE DEVELOPMENT

Early school-age children should be able to use simple, but complete, sentences that contain an average of five to seven words. As the child goes through the elementary school years, grammar and pronunciation become normal. Children use more complex sentences as they grow.

Language delays may be due to hearing or intelligence problems. In addition, children who are unable to express themselves well may be more likely to have aggressive behaviour or temper tantrums.

A six-year-old child normally can follow a series of three commands in a row. By age ten, most children can follow five commands in a row. Children who have a problem in this area may try to cover it up with backtalk or clowning around. They will rarely ask for help because they are afraid of being teased.

BEHAVIOR

Frequent physical complaints (such as sore throats, tummy aches, or arm or leg pain) may simply be due to a child's increased body awareness. Although there is often no physical evidence for such complaints, the complaints should be investigated to rule out possible health conditions. This will also assure the child that the parent is concerned about their well-being.

Peer acceptance becomes more important during the school-age years. Children may take part in certain behaviours to be part of "the group." Talking about these behaviours with your child will allow the child to feel accepted in the group, without crossing the boundaries of the family's behaviour standards.

Friendships at this age tend to be mainly with members of the same sex. In fact, younger school-age children often talk about members of the opposite sex as being "strange" or "awful." Children become less negative about the opposite sex as they get closer to adolescence.

Lying, cheating, and stealing are all examples of behaviours that school-age children may "try on" as they learn how to negotiate the expectations and rules placed on them by family, friends, school, and society. Parents should deal with these behaviours in private with their child (so that the child's friends don't tease them). Parents should show forgiveness, and punish in a way that is related to the behaviour.

It is important for the child to learn how to deal with failure or frustration without losing self-esteem.

SAFETY

Safety is important for school-age children.

- School-age children are highly active. They need physical activity and peer approval, and want to try more daring and adventurous behaviors.
- Children should be taught to play sports in appropriate, safe, supervised areas, with proper equipment and rules. Bicycles, skate boards, in-line skates, and other types of recreational sports equipment should fit the child. They should be used only while following traffic and pedestrian rules, and while using safety equipment such as knee, elbow, and wrist pads or braces, and helmets. Sports should not be played at night or in extreme weather conditions.
- Swimming and water safety lessons may help prevent drowning.
- Safety instruction regarding matches, lighters, barbecues, stoves, and open fires can prevent major burns.

- Using an appropriate car seat and wearing seat belts is the most important way to prevent major injury or death from a motor vehicle accident.

Role of Diet in the Child Development:

The school age is a period of steady growth usually with fewer feeding problems than early child hood years. These higher requirements are balanced by a more efficient use of protein for development rather than energy. Children should be given a nutritious breakfast, and then send them to school with a tiffin containing home-made food. A hungry child tends to eat, whatever is available in school canteen or nearby. Best training is to let your child understand, what is good and not-so-good in nutrition.

The benefits of good nutrition in a well-balanced diet are that it prevents malnutrition, helps build the child's immunity, reduces the chances of the child being underweight or obese and even minimizes the chances of chronic health issues when they get older. Good nutrition in the growing age builds up our bones and muscles and provides fuel for every body cell to survive and function. Exercises build stamina and positive energy in children.

Malnutrition occurs when the body does not get the nutrients it needs. A child who does not receive enough nutrients can be at risk for delayed or stunted growth.

There are many healthy alternatives for snacks and desserts in Indian diet. Let the child learn to choose some of the items from healthy food groups as snacks. These can be things such as grams (pus), puffed rice, peanut/groundnut chikki , sprouts, nuts, cheese, curd/yoghurt, and fresh fruit or vegetables. Idli, upma, dhokla, apple, pancake and poha (pressed rice), and cornflakes can also be used as snacks.

The same ingenuity may go with dessert at the end of a meal. Sliced fruits, fruit-custard, kheer, carrot halwaor yoghurt and homemade banana bread and nuts with honey are the healthier options. High-calorie sweet stuff such as cakes and chocolate or sweets must be reserved only for occasional consumption.Child should avoid junk foods, ultraprocessed foods, nutritionally inappropriate foods, carbonated/caffeinated drinks, and sugar-sweetened beverages (JUNCS) because these are high in salt, saturated fat, and sugar, but low in fiber and nutrients. As well, a child who has an excess of specific nutrients or food types can be at risk for obesity. The risk of childhood obesity and type-2 diabetes increases when children regularly consume JUNCS. Sweet drinks are high in sugar but low in nutrients. They can cause weight gain, obesity, and tooth decay. These drinks make your child less hungry for healthy meals. Caffeinated foods and drinks are not recommended for children because caffeine interferes with calcium absorption. Caffeine is a stimulant, which means it gives children artificial energy. Coffee, tea, energy drinks, and chocolate, all contain caffeine.

For girls pubertal timing is affected by childhood body mass index (BMI) and percentage of body fat;

Government has taken three steps in this direction that society has to enforce:

1. Ban on the sale and advertisements of junk foods in school canteens and 50 meters around school campuses by the Food Safety and Standards Authority of India (FSSAI). They are advised to promote safe and wholesome food in schools (The Food Safety and Standards Regulations, 2020).

2. Barring food business operators (FBOs) from advertising and marketing of high in fat, salt, and sugar (HFFS) foods to children in school premises.

3. Schools are advised to promote "safe food and balanced diets" and to convert school campuses into "Eat Right Campus". They are advised to:

- Provide safe and healthy food, preferably local and seasonal
- Adopt practices on food waste as per the guidelines by the National Institute of Nutrition (NIN)
- School should engage nutritionists/dietitians to assist in the preparation of menu for the children. Parents and some students may also be involved for betterment of food practices. Concept of "fruits-bar" in school canteen is a good idea. Potable water should be freely available in every school.

Some Tips

Meal time is family time and therefore make it 'screen-free time'.

Healthy food can be made attractive and eating made pleasure, by decorating your dishes, cutting fruit or sandwiches into interesting shapes and dressing salad differently.

Involve children in cooking and serving meals. Let them learn cooking and try new recipes. Encourage their creativity.

Eating a healthy breakfast every day is a good habit.

Let children know, where food comes from; let them buy vegetables, fruits and food from the shops.

If possible, grow some vegetables at home.

Decide menu by asking children.

Do not keep junk food in the house, no cold-drinks in refrigerator.

Keep fruit handy for a snack.

Make a habit of washing hands before preparing, serving, and eating meals.

INTEXT QUESTIONS

I. Short Questions

1. Give the milestones of physical development during 9-12 Years.
2. What is the role of diet in the development of childhood years?

II. Essay Questions

3. Describe the physical and mental development of the child.
4. Discuss the milestones of physical development between 6-12 years.

III. Activity

- Choose 5 children among 6-12 years.
- List the items consumed by them for breakfast, lunch and dinner.
- Identify the healthy food choices they made and the junk food by labelling with green and red.

UNIT - 8

CARE OF ADOLESCENTS

Adolescence is the period of transition between childhood and adulthood. Children entering adolescence are going through many changes in their bodies and brains. These include physical, intellectual, psychological and social challenges, as well as development of their own moral compass. The changes are rapid and often take place at different rates. It can be an exciting yet challenging time in the life of a teenager. Adolescence is the time when the child becomes more independent and begins to explore their identity.

Physical Development

Physical development in adolescence includes changes that occur through a process called puberty. During puberty, the hormones secreted by the glands cause the body to physically change and sex organs to mature. The child will experience the growth spurt. During this time, they'll grow rapidly in height and weight. Other physical changes may include body odour, acne and an increase in body hair. Growth spurts usually happen earlier for girls which is between 10-14 years while for boys it is 14-17 years.

Early and Late Maturation

Puberty is the time in life when a boy or girl becomes sexually mature. Puberty results in very rapid somatic growth, brain development, sexual maturation, and attainment of reproductive capacity. It is accompanied by final maturation of multiple organ systems and major changes in the central nervous system and in psychosocial behaviour.

Puberty is considered early if it starts before eight years in girls, or before nine in boys. Puberty is considered late if there are no signs of puberty by 13 years in girls, and 14 in boys.

Early puberty is much more common in girls than in boys. Girls who mature early can have a lower self-image and higher rates of depression, anxiety and disordered eating. Early-maturing girls are at increased risk of a range of psychosocial problems including depression, substance abuse and early sexual behaviour. Early pubertal timing was largely associated with increased risk for poor psychosocial, behavioural, and physical health was generally protective during adolescence for both girls and boys. Unlike their early maturing counterparts, late maturing girls find themselves in childish state both physically and in sexual maturation. Have problems with peer relations and self-esteem.

Boys who mature early can have a higher self-image and be more popular with their peers.Delayed puberty will affect psychosocial functioning and educational achievement.

Psycho Social Development

Psychosocial development entails the encounter between adolescents' "increasing capacities" and their culture's "opportunities and limitations"

The psychosocial tasks of adolescence are complex and include attainment of cognitive maturity, development of morals and values, and establishment of a separate identity.

Cognitive Development

Brain development in adolescence is on a higher level than that of childhood. Children are only able to think logically about the concrete while adolescents move beyond these limits and can think in terms of what might be true, rather than just what they see as true. They can deal with abstractions, test hypotheses and see infinite possibilities. Yet adolescents still often display egocentric behaviours and attitudes.

During cognitive development in adolescence, large numbers of neurons grow rapidly. This allows for more complex, sophisticated thinking. The front part of the brain fully develop during these years. This area of the brain controls executive functions such as planning, prioritizing and controlling impulses. Because it develops so late,teenager may have lapses in judgment.

Mental characteristics that develop during adolescence include improved:

- Abstract thinking.
- Reasoning skills.
- Impulse control.
- Creativity.
- Problem-solving abilities.
- Decision-making skills.

Social Development

The most important task of social development in adolescence is the search for identity. This is often a lifelong voyage that launches during adolescence. Along with the search for identity comes the struggle for independence.

The child develops the following characteristics

Turn less in the midst of a challenge.

Show more independence.

Spend less time with family and more time with their friends.

Feel anxious, sad or depressed, which can lead to trouble at school or risk-taking behaviors.

Identity development occurs. A positive self-identity is also associated with higher self-esteem. You can help reinforce a positive self-identity in your child by:

- Encouraging their efforts.
- Praising their good choices.
- Inspiring perseverance.

Emotional and Moral Development

- During adolescence, the child will begin to observe, measure and manage their emotions. They become more aware of their own feelings and the feelings of others. The process of emotional development will give the child the opportunity to build their skills and discover their unique qualities.

As they become more independent, some adolescents welcome these new challenges. Others may need more support to build their self-confidence. The physical, hormonal and emotional changes may affect their self-esteem.

- The child will also begin to develop morals and values that they'll hold throughout their life. They may begin to see that not every decision is black or white. They'll develop empathy when they begin to see why people make choices that differ from their own. They'll also begin to have a deeper understanding of why there are rules in the world. They'll start to form their own opinions on what's right and what's wrong. They may also spend time thinking about their religious beliefs and spirituality.

Role of Diet in Emotional Development

Adolescence represents a unique developmental period that is marked by increased independence in daily decisions. It is a nutrition-sensitive phase for growth, in which the benefits of good nutrition extend to many other physiological systems. Lack of age-appropriate nutrition may impact on adolescents emotional, behavioural and intellectual development. Under nourished teenager may struggle to maintain attention, learning new skills or even retaining everything as a well-nourished child. Due to the lack of some vitamins and minerals, teenagers could feel emotionally unstable or may deal with higher levels of anxiety and depression. From how active to how lethargic the child feel is related to optimum nutrition. Early adolescence, nutrition has a formative role in the timing and pattern of puberty, with consequences for adult height, muscle, and fat mass buildup, as well as risk of non-communicable diseases in later life. Nutritional effects in adolescent development extend beyond musculoskeletal growth, to cardiorespiratory fitness, neurodevelopment, and immunity.

Influence of Parents, Peers' School and Teachers in Developing Food Habits

Parental and familial influences can alter youth behaviour. The environment in which a child grows up is strongly influenced by the family. Consequently, food habits and preferences of children are often mediated by parents.

During adolescence just as parents and family influences the peer acceptance is of critical importance, there by social pressures play a major role on their eating behaviours. Through social reinforcement, for instance, peers may indirectly bolster the idea of the "ideal" thin body shape, thereby pressuring teens to skip meals or diet. Adolescents may also imitate the behaviours of their peers who practice unhealthy eating behaviours. Peers' influence on adolescents' healthy eating behaviour is often found to be negative by the increase in consumption of energy-dense and low-nutrition value foods. However, in some cases, this influence can also be a positive one, and there is a need to find effective ways of how it could be used in encouraging healthy eating behaviour of adolescents.

Schools play an important role in shaping lifelong healthy eating. Healthy students are better learners. Whether school meals are served in the cafeteria or classrooms, it's important for students to have enough time to eat, connect with peers, and enjoy their meal. Schools should ensure that students have at least 10 minutes once they are seated (seat time) for breakfast and at least 20 minutes for lunch. Having enough seat time is linked to more consumption of fruit, vegetables, lunch boxes and less waste. School food environment policies and safety standards can be effective in improving targeted behaviours, such as reducing the intake of commercially sold food and beverages and unhealthy snacks. To foster an enabling environment for good nutrition, policies should aim to promote the consumption of fruit,

vegetables, pure milk and clean water by children in schools; prevent the sale of sweetened or carbonated drinks, flavoured milk, salty snacks and fatty foods in school canteen shops or vending machines, restrict what foods and drinks can be sold by vendors near to schools, and provide guidelines on the foods that parents give to their children to bring to schools as snacks or in a packed lunch.

Teachers serve as role models for their students, by supporting healthy student behaviours through role modelling healthy eating behaviours, incorporating personal nutrition knowledge into daily classroom activities, and avoiding unhealthy classroom food practices. The easy availability and accessibility of energy-dense, nutrient-poor foods, the limited availability of nutritious foods, the absence of written food policies, and inflated prices of nutritious foods were reported as problems in the Indian school food environment. However, the schools should restrict the sale of sugar-sweetened beverages and adopt hygienic food practices. Certain novel ideas should be in place for creating healthy school food environments and effective school canteen policies. Teachers understand the multiple factors affecting adolescent nutrition, including the family, the school environment and knowledge, attitudes and behaviours of adolescents. Teachers help to support the development and practice of healthy dietary behaviours and food skills. Teachers support and reform to overcome existing barriers such as time restrictions, financial constraints and limited educator knowledge.

INTEXT QUESTIONS

I. Short Questions

1. Give the physical changes in Adolescents.
2. Write a note on social, emotional and Moral development
3. How do parents and peers influence the food habits of adolescents.

II. Essay Questions

1. Discuss the role of diet in the emotional development during adolescence ?

III. Activity Based Questions

1. Identify the influencing factors/persons on food habits among your adolescent friends in your colony and list it.

S. No.	Name of the friend	Influencing factor / person	Food habits developed / limited

UNIT - 9

PERSPECTIVES OF ADULTHOOD

Adulthood is the stage where growth is complete and the person assumes various responsibilities.

Early Adulthood: 18-40 years

• Middle Adulthood: 40-60 years

• Late Adulthood: 60 years and above.

This stage of life is characterized by the Period of Adjustments (New Patterns of Life & New social Expectations) and with new roles to play.

The individual develops new Attitudes, Interests and Values (pacing with new roles) and consider this as a difficult period of life.

For many of them it is settling down age while few individuals think carefree freedom.

Factors influencing nutrient requirements:

1. **Age:** A gradual and a rapid decline occurs with age until adult age.
2. **Sex:** The BMR is higher in adult males as compared to adult females though it is not due to direct influence of sex differences, but are due to the differences in body composition.

   Males have a greater amount of muscles and glandular tissues which is metabolically more active whereas, females have greater adipose tissues which is metabolically less active, Hence energy requirement of males is higher than of females.
3. **Climate:** It is known that the BMR is lower in tropics then in temperate zones. Hence the energy cost of work is slightly higher when the temperature falls.
4. **Body Size:** It will have an important effect on energy needs because a larger body has a greater amount of muscles and glandular tissue to maintain, thus requiring higher energy allowances. A tall thin individual has a greater surface area hence will have a higher basal metabolic rate than an individual of the same weight who is short and fat.
5. **Secretion of Endocrine Glands:** The thyroid gland in particular exerts a marked influence on the energy requirement. If it is overactive (hyper-thyroidism), the BMR will increase. If the activity of the gland decreases (hypo-thyroidism), the BMR will be reduced.
6. **Status of Health:** During the periods of fever as well as malnutrition, the BMR of an individual is affected. Illness involving an elevation of body temperature markedly increases the basal heat production thus increasing the BMR, hence increased energy requirement.
7. **Altered Physiological States:** During pregnancy and lactation, the energy needs are increased because of an elevated BMR. In pregnancy; this additional energy is needed to support the growth of foetus and maternal tissues. During lactation energy is required for synthesis of milk.
8. **Effect of food:** A certain amount of work is expended in the digestion of food, its absorption transfer to the tissues and utilization. The increased heat production as a result of the ingestion of food is known as the specific dynamic action of the food. Protein when eaten alone has been

shown to increase the metabolic rate by 30%. On the basis of the mixed diets, which are usually consumed, the specific dynamic action of food is approximately 10% of the energy requirement.

9. **Extent of Physical activity:** Any kind of physical activity increases the energy expenditure above the basal energy need. Energy for the performance of all types of physical activities ranks next to basal metabolism in amount of energy expended.

10. Sleep causes a reduction of about 10% in the BMR depending on the number of hours spent in sleeping and its manner i.e. restless/ peaceful. The energy need is determined by the nature and duration of physical activity. ?Sedentary work, which includes once work, book keeping, typing, teaching, etc., calls for lesser energy than moderate work (more active and strenuous occupations) such as nursing. home making, or gardening.

Special Demands for Pregnancy and Lactation

Pregnancy is the term used to describe the period in which a fetus develops inside a woman's womb or uterus. Pregnancy usually lasts about 40 weeks, or just over 9 months,as measured from the last menstrual period to delivery. Health care providers refer to three segments of pregnancy, called trimesters. The phase of production and secretion of milk by the mother is called lactation.

Dietary tips to follow during pregnancy to meet the additional demands

- During pregnancy vitamin C rich foods like Amla , Guava and orange should be included in the diet to improve the iron absorption of plant foods.
- Add green leafy vegetables and other vegetables to daily diet like Methi roti, Palak roti, Vegetable dosha and idli.
- Include small and frequent meals to prevent nausea and vomiting.
- Pregnant woman has to include variety of foods to meet the requirements of all nutrients.
- Green leafy vegetables, nuts and legumes has to be included in the diet as they are rich sources of folic acid.
- Use double fortified sale but < 5 g a day

Avoid the following:

- Avoid smoking, chewing tobacco, consumption of alcohol and carbonated beverages.
- Do not eat foods made with hydrogenated fats.
- Avoid sleeping immediately after meal.
- Do not wash vegetables after peeling.
- Avoid drinking tea, coffee and other caffeinated drinks along with meals or after meals.
- Donot lift heavy objects or do strenuous exercises.

The foods a breast-feeding mother eat are important for both mother and the baby's health A breast-feeding mother has to make healthy choices to help milk production.

- Protein foods such as lean meats, eggs, beans, dairy, lentils and seafoods.
- Eat good sources of calcium.
- Consume foods rich in iron.
- The fluid in the diet is necessary for adequate milk production. So fluids like vegetable soups, fresh juices, jeera water milk, coffee tea etc can be given apart from water.
- Cold beverages and meals should be avoided, warm and hot meals are preferred.
- Mother should be given small and frequent meals.

Care for Elderly:

When people grow old, they require a lot of attention with their mental and physical wellbeing as it becomes difficulty to carry out every small chore on their own. Providing older adults good elderly care by yourself or with the help of professionals stops them from feeling isolated and depressed. You help continue to provide them a sense of community, a social life, that empowers and energizes them. Gain insight into their value.

Older adults may have reached the point of their life where they need to get adequate medical care to ensure they are healthy. To achieve this, they may need assistance to get a physical exam, eye checkup, foot care, physical therapy and nursing care. Older adults need proper nutrition to stay active and healthy.

When elder people are looked after carefully, it helps in maintaining a good balance in the society. Getting the right elder care will not only help in giving a new life to the elder community but also will enable the world to become a happier place to live in with dignity. One should feel that taking care of the elders of the house is not only a moral obligation but have care and respect for them.

Some of the most common health problems in the elderly include:

- Cognitive decline.
- Balance issues.
- Oral health problems.
- Heart disease.
- Osteoarthritis or osteoporosis.
- Respiratory diseases.
- It's estimated that 25 percent of adults age 65 and older have type 2 diabetes.
- Influenza or pneumonia.

Concerns & issues of Human Development:

Human development is a process of enlarging peoples freedoms and opportunities and improving their well being.

Developmental concerns include delays or abnormal patterns of development in the areas of communication/language, motor skills, problem-solving or social and adaptive behavior. These concerns are usually based on comparison to other children of the same age.

Issues in the progress of human development according to Human Development Index are:

(1) Health

(2) Sex Ratio

(3) Women Empowerment.

(1) Health :

Poor medical conditions, poverty, population growth, malnutrition, contagious diseases, pollution, epidemics, and more have been posing a great threat to human development.

(a) Diseases and malnutrition: Water borne diseases and malnutrition have raised problems for people. As the ladies, children and poor people are not getting nutritious food, suffering from lack of nutrients, basic minerals, many vitamins and proteins, their development has either stopped or their development is in-complete.

(b) Environmental pollution and poisonous gases are another challenge in our daily life.

(c) Increasing urbanization, crowded habitats have created more problems for newly raised health facility.

(2) Sex ratio: The ratio of the female population to the male population is unfavourable. Sex ratio is the ratio of males to females in a population. It is usually defined as the number of females per 1,000 males.

According to 2022 census, in India the sex ratio was 1020 females per 1000 males.

Gender inequality in India has given rise to multiple social problems such as discrimination, infanticide, and more.

The proportion of female illiteracy is larger, their per capita income is lower, fewer women have employment opportunities. Gender-based discrimination and inequality in economic, political, social-cultural and religious fields poses a huge challenge to human development.

(3) Women Empowerment:

Women empowerment is expanding from working as a labourer to work in business and commerce, communication and many other jobs because of increasing education, training and skilled programmers. Still there is a lot of scope for development. So for extending it, we have to make a lot of efforts. Women comprise 48% of the total population of India according to the 2011 census and constitute almost half of India's total population.

This indicates that their empowerment is directly connected to the overall development of the country.

Women empowerment essentially involves the economic independence of women – to be able to work and earn so that they can be independent.

INTEXT QUESTIONS

I. Short Questions

1. What are the issues in the human development?
2. Why is it important to care for elderly?
3. Special recommendations are given for a pregnant and lactating woman. Justify?

II. Essay Questions

1. What are the factors influencing nutrient requirements among adults?

III. Activity

Visit an old age home in your area and identify the elderly with their health problems and Mention the assistance paid by you to them.

UNIT - 10

FOOD SECURITY

Food Security: Food security as stated by World food summit is when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Components of Food Security: The three components of food security are Physical availability, access and utilization of food.

- Physical availability (having sufficient quantities of appropriate food available), food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and physical access to food.
- Access (having adequate income or other resources to access food). An adequate supply of food at the national or international level does not in itself guarantee household level food security. Food access is another dimension of food security which encompasses income, expenditure and buying capacity of households or individuals. Food access addresses whether the households or individuals have enough resources to acquire appropriate quantity of quality foods.
- Utilization/consumption (having adequate dietary intake and the ability to absorb and use nutrients in the body). Food utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals.

Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on food security status. For food security objectives to be realized, all three dimensions must be fulfilled simultaneously.

Nutrition theorists believe that the total number of calories available in India is marginally higher than what are absolutely essential for the upkeep of Indian population at a normal level of activity. But it is observed from the studies that the average Indian consumption of essential food components is low Our consumption is considerably low compared to that of most of our Asian neighbours.

The Indian sub-continent, consisting of India, Pakistan, Bangladesh, Sri Lanka, and Nepal, (besides Afghanistan, Bhutan and Maldives), seems to form the poorest region of the world in the average per capita consumption of essential food components. Within Asia, all countries outside the Indian sub-continent are doing rather well at least in terms of the average availability of food.

The level of shortage in the availability of cereals and pulses for direct human consumption is low compared to other countries while the amount of cereals and pulses utilized for various other purposes, especially for the feeding of cattle and other domestic animals, the shortage in India compared to the rest of the world becomes much larger. Average consumption of cereals in India has risen by about 180 kg per capita per year.

Average Annual Consumption of Staple Foods like total grains and roots is 200 kg and meat and fish is 207 kg percapita per year.

The availability of non-staples in India is thus not as poor as that of staple grains and pulses.

Consumption of vegetables in India, is fair of the 56 kg of vegetables consumed, onions, the most widely used vegetable supplement, constitute less than 4 kg. Average consumption of nuts in India is negligibly small. Average consumption of fruits in India is only 28 kg per capita per year. Average consumption of sweeteners, fats, eggs and milk 7.2 kg, 1.3 kg and 56 kg per capita per year respectively.

In India the average daily requirement of essential food components for people living in different regions, differ due to the differences in the environmental temperatures and in the age and gender profiles of the populations. It is also true that the affluent would perhaps always indulge in a certain amount of overeating. But it is still difficult to understand the wide difference in the quantities of essential food components consumed by us and the others across the world. It can mean only one of the two things: either the Indians are grossly undernourished, or citizens of the currently affluent regions of the world are sickeningly over-fed.

Nutrition Security:a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Security means consistent access, availability, and affordability of foods and beverages that promote well-being, prevent disease, and, if needed, treat disease.

Nutrition security goes beyond having enough food to eat and focuses on food quality for a healthy life. A healthy diet will help achieve nutrition security and includes fruits, vegetables, whole grains, lean proteins, low-fat dairy, and healthy fats. These foods provide essential nutrients such as vitamins, minerals, fiber, and antioxidants necessary for maintaining good health.

Proper nutrition is a fundamental component of good health. It also plays a critical role in reducing the risk of cardiovascular diseases, obesity, and diabetes. Nutrition security is vital for vulnerable populations such as children, pregnant and breastfeeding women, and people living in poverty. These populations often rely on inexpensive, calorie-dense foods that lack essential nutrients, leading to adverse health outcomes. Promoting nutrition security requires addressing the root causes, such as lack of access to healthy foods and limited education on nutrition and healthy eating.

Government Schemes and Campaigns for Food Security:

A country's food security is ensured if there are enough nutrient-rich foods available for all of its residents. Three criteria are used to guarantee food security in a nation.

Making sure there is adequate food for everyone is the first step. The ability and resources to get sufficient food are shared by all people, which is the second point. Last there shouldn't be any barriers to getting food.

In the mid-1970s, the Government of India launched three important food intervention programmes for food security. They include Public Distribution System (PDS) for food grains; Integrated Child Development Services (ICDS) (introduced on an experimental basis) and Food-for-Work (FFW). Over the years, several new programmes have been launched and some have been restructured with the growing experience of administering the programmes. At present, there are several Poverty Alleviation Programmes, mostly in rural areas, which have an explicit food component also.

The food security system in India was carefully planned and consists of two parts: a buffer stock and a public distribution system.

To ensure that food is available to all societal segments. The government establishes a buffer stock of food grains in order to distribute the purchased food grains at a price below market value to the poorer sections of society and to places with food shortage. Therefore, keeping buffer stock is a measure the government takes to guarantee food security.

The Government of India introduced Revamped Public Distribution System (RPDS) in 1,700 blocks in the country in 1992. The target was to provide the benefits of PDS to remote and backward areas. From June 1997, in a renewed attempt, Targeted Public Distribution System (TPDS) was introduced to adopt the principle of targeting the poor in all areas. In 2000, two special schemes were launched Antyodaya Anna Yojana (AAY) and the Annapurna Scheme (APS) with special target groups.

Antyodaya Anna Yojana (AAY): In India, the Antyodaya Anna Yojana (AAY) public distribution system was introduced in 2000. The system's primary goal is to eliminate hunger in India and ensure food security for the populace. Each qualified family received 25 kg of food grains under this Yojana at a heavily discounted rate of Rs. 2 per kg of wheat and Rs. 3 per kg of rice.

Annapurna Scheme (APS): Annapurna Scheme was introduced on April 1st, 2000. It aims to provide food security to satisfy the needs of elderly people who are qualified but have not received benefits from the National Old Age Pension Scheme (NOAPS).

Minimum Support Price: In states where there is an excess of production, the Food Corporation of India buys wheat and rice from the farmers. For their crops, the farmers receive payment at a predetermined price. Minimum Support Pricing is the name given to this price. Every year, before the planting season, the government announces the MSP to give farmers incentives to increase the production of these crops.

Buffer Stock is the supply of wheat and rice that the government has purchased through the Food Corporation of India (FCI). The government uses this buffer stock to help the less privileged members of society or in the event of a natural disaster.

Issue Price: The government offers grains from the buffer stock to the poorer classes of the population at a price that is far less than the market rate in order to assist them. The Issue Pricing is the subsidized price.

Fair Price Shop: The FCI buys food, which is then given to the less privileged members of society through ration stores under government control. The term "Fair Price Shop" refers to a store that has been granted a license to sell necessary commodities to holders of ration cards under the Targeted Public Distribution System pursuant to an order issued under section 3 of the Essential Commodities Act, 1955. Nowadays, ration shops may be found in the majority of towns, villages, and cities. In the entire nation, there are around 4.6 lakh ration stores. Food grains, sugar, and cooking oil are kept in stock at ration shops, sometimes referred to as Fair Price Shops. People can buy these products for less money.

The National Food Security Act,2013 (NFSA 2013) converts into legal entitlements for existing food security programs of the Government of India. It also includes the Mid day Meal Scheme, Integrated Child Development Services Scheme, and the Public Distribution System.

The PDS has proved to be the most effective instrument of government policy over the years in stabilising prices and making food available to consumers at affordable prices. It has been instrumental in averting widespread hunger and famine by supplying food from surplus regions ofthe country to the deficit ones.

INTEXT QUESTIONS

I. Short Questions

1. Write about any 2 schemes launched by Govt of India to address food security?
2. How is nutrition security different from Food security?

II. Essay Questions

1. Discuss the Components of Food security?
2. Write the govt schemes and campaigns for attaining food security in India?

III. Activity

Identify the beneficiaries of Govt schemes for food security in your area and record the details ofthe scheme they are associated with and the details of the scheme.

MODULE III
FOOD SPOILAGE AND PRESERVATION

UNIT - 11

FOOD SPOILAGE

Food spoilage refers to microbial changes that render a product unfit or unpalatable for consumption. Most food stuffs serve as good media for the growth of many microorganisms. Once the microorganism grows, they will produce changes in appearance, flavour, odour and other qualities of food. Food is subject to physical, chemical and biological deterioration.

Types of Spoilage

a) Growth and activities of micro organisms – i.e bacteria, yeasts and moulds.

b) Action of food enzymes (enzymatic browning).

c) Infestation by insects, parasites and rodents.

d Chemical changes in food (i.e. not catalyzed by enzymes of the tissues or microorganisms).

Example: Chemical oxidation of fats producing rancidity is non-enzymatic browning in foods like Maillard Browning.

e) Physical changes caused by freezing, drying (caking).

f) Presence of foreign bodies.

g) Contamination with chemical agents.

Based on the ease of spoilage the foods are classified as

- Stable or Non-Perishable foods like flour and sugar.
- Semi perishable foods like apple - remain unspoiled if stored properly.
- Perishable foods like milk that spoil easily without special preservative methods.

The spoilage by microbes can result in unwholesome effects in foods and changes in colour, texture and flavour of the food.

Table 21 Spoilage caused by Micro Organisms

Flavour/aroma	Food	Chemical	Organisms
Nitrogenous	Egg, Meat, Fish	NH3,H_2S	Pseudomonas Clostridium, Lactic acid bacteria, Bacillus
Souring	Dairy, beer, wine	Acetic, Citric	Lactic acid lactic acid bacteria,
Alcoholic	Fruit Juice	Ethanol	Yeast
Fruity	Meat	Ester of short chain fatty acids	Pseudomonas

Potato like flavour	Meat, egg.	2 methoxy 3 isopropyl pyrazine	Pseudomonas
Texture			
Texture	**Food**	**Chemical or Bio Chemical Causes**	**Organisms**
Slime	Meat, Confectionary	Polysaccharides	Pseudomonas Leuconostoc Bacillus
Ropiness	Bread, Milk	Polysaccharides	Alcaligenes Bacillus,
Softening	Fruits and vegetables	Pectinase, Cellulase, Xylanase	Erwinia, Clostridium
Curdling	Milk, Meat	Acid Production	Yeast, Lactic acid Bacteria.

Colour	**Organism**
Redspot	Lactobacillusplantarum
Browning	P.nigrifaciens
Blackening	Lacto bacillus viridescens
Purple color	Halo bacterium
Green color	Pseudomonas
Blue color	Penicillium
Pink	Rhizopus, Serratia.

Biochemical Changes Causing Food Spoilage

Most of the changes brought about in foods are due to alteration in biochemical properties of the food by microbes. These can be due to carbohydrate, protein, lipid or pectin degradation.

Carbohydrate Decomposition

When degraded by microorganisms, they produce CO_2, H_2, lactate, acetate, butyrate. Depending upon nature of carbohydrate and type of microorganism involved. The food may turn slimy and they may taste or smell unpleasant and are termed stale foods or spoiled foods.

Table 22: Different Types of Fermentations

Fermentation	Product
Alcoholic	Ethanol, CO_2
Homofermentative	Lactic Acid
Hetero fermentatic	Lactic acid, acetic acid, ethanol, CO_2
Propionic acid	Propionic acid, acetic acid, CO_2
Butyric Acid	Butyric acid, CO_2, H_2.
Mixed Acid	Lactic acid, acetic acid, H_2. Ethanol, CO_2, butanediol, formate.

Protein Decomposition: Proteins are degraded by microorganisms into peptides and amino acids.Many peptides contribute to spoilage due to their bitter or sweet taste.

Lipid Degradation: Lipids are degraded by micro organisms into fatty acid, glycerol, aldehydes, ketones etc. This is also called rancidity and it produces bad smell and taste when food becomes old.

Pectin Hydrolysis: Pectin present in fruits and vegetables provide mechanical rigidity. Pectin can be degraded by pectinases that may get activated upon ripening of fruits.It may turn the fruit soft. Once mechanical damage has taken place, microbial attack is initiated.

Micro Organisms Causing Food Spoilage

Primary Sources: Viable organisms are found in very wide range of habitats; from polar regions to hot spring; from highly acidic to alkaline conditions; in the presence as well asabsence of oxygen.Therefore, the normal flora of food, soil, water or atmosphere is exposed while preparation, therefore contributes a major role in microbial spoilage of food.

Micro Organisms in Air: Air is only a means of dispersal rather than growth of micro organisms. Air contains many Gram +ve rods and cocci, including flora generated from animal or human source or water. Common examples of bacteria in air are Micrococcus, Corynebacterium, Bacillus, Streptomycesetc. Common fungi found in air include spores of Penicillium and Aspergillus besides Fusarium and Cladosporium.Coughing and sneezing also generate aerosol that may carry viable microorganisms.

Microorganisms of Soil: Oil has got diverse micro flor a like bacteria, protozoa, fungi and algae. Therefore, food should be protected from dirt to reduce spoilage. More over, soil is a reservoir of resistant structures like endospores of Bacillus and Clostridium of many fungi that can easily spoil foods.

Microorganisms of Water: Fresh water of rivers and lakes have microflora of terrestrial animal and plant sources. It can also act as vehicle for bacteria, protozoa, viruses etc. leading to spoil age of food if it is used for washing the foods.

Microorganisms of Plants: Plant surfaces have natural microflora called phylloplane flora (on leaf) and rhizoplane flora (on roots) and this can include fungi like Cladosporium, Penicillium, Aspergillus etc. yeast of genera Sporobolomyces and Bullera and some bacteria like Erwinia, Pseudomonas, Xanthomonas, Lactobacilli, Streptococci, Leuconostoc etc. Erwinia can cause blackleg disease of potato; and soft rot of potatoes during storage. Cereal grains can be infected by Cladosporium, Penicillium, Aspergillus etc.

Microorganisms of Animals: Intestinal tract of animals has many micro organisms and if shed into water bodies can cause spoilage of food when used for washing foods.Their skin also contains many micro organisms that can cause food contamination. Staphylococcus and Corynebacterium are important microorganisms.

Utensils: The utensils used to store the harvested fruits and vegetables are contaminatedwith surface organisms present on them.These may lead to contamination of other products put into them later on.

Foodhandlers: Microorganisms on hands and outer garments of handlers can contribute towards microflora of the concerned food.Nasal cavity and mouth are also important sources of micro organisms.

Other Parameters of FoodSpoilage: In addition to this above factors, food spoilage has also been co-related within trinsic extrinsic and implicit factors.

Intrinsic Parameters: These are the parameters that are the inherent properties of the food.They include: pH, Moisture content, Nutrient content, Anti microbial constituents, Oxidation Reduction potential.

pH: Most microorganisms prefer a pH around 7.0 (bacteria) but some can grow even below pH of 4.0 (mainly fungi Oracidophiles); or at pH around 11.0. Many foods naturally have weak acids like acetic acid and citric acid present in them eg. some citrus fruits.

Once internal surface is acidified, there is a breakdown of normal membrane, inhibition of bio chemical pathways and cell growth leading to spoilage of food.

Moisture Content: The water requirement of a micro organism is represented as aW which means water activity. All microorganisms have optimum and minimum aW requirement. The maximum limit for growth of microbes is almost less than 1.0. Yeast and mold, however, can tolerate lower aW than bacteria. The Gram +ve bacteria have lower aW than Gram –ve bacteria.

Chemical composition of a food item generally influences the type of spoilage , microbe as well the products liberated during growth.

Nutrient Content: Foods rich in nutrients have microbes that are generally chemo heterotrophs using organic compounds as source of energy and carbon requirement. Foods also provide enough water, nitrogen, minerals and vitamins to microorganisms.

Antimicrobial Substances: Some foods naturally contain the antimicrobial substances to prevent them from spoilage. These substances have been reported from plants, foods as well as microorganisms.

Host factors: Some plants contain antimicrobial agents like eugenol in cloves, cinnamon etc. allicin in garlic, onion; and thymol in oregano. They are reported to act on cell membrane of microorganisms. Eggs contain antimicrobial agents like lysozyme that weaken cell wall of Gram +ve bacteria, conalbumin

that chelates metals, avidin that binds biotin ovo flavo protein that sequesters riboflavin. Milk contains lacto peroxidase system. Hypo thiocyanite is an oxidizing agent present in foods that can inhibit growth and metabolism of many gram +ve and Gram-ve bacteria. Lactoferrin is an iron binding protein inhibitor that inhibits microbes. Fatty acids present in foods are also bacteriostatic.

Microorganisms: They contain H_2O_2, organic acids and bacteriocins as the antimicrobial agents. Bacteriocins are antimicrobial proteins that can inhibit related bacteria and have a narrow inhibitory spectrum. They are added to dairy items like cheese and also in canned products to prevent bacterial spores

Oxidation Reduction Potential: The Redox potential of a substrate is the ease of particular substrate to either gain or lose electrons. It depends upon available oxygen, pH and access of food to atmosphere. The microbes are classified according to their oxygen requirement as:-

(i) Micro aerophilic: Require O_2 at less than atmospheric level.

(ii) Obligate aerobe: They require sufficient amount of O_2

(iii) Obligate anaerobe : Oxygen may be harmful.

(iv) Facultative anaerobe : Grow well in presence as well as absence of oxygen.

In presence of oxygen, some extremely toxic superoxide radicals are made. However, the microbes that can grow in presence of O_2 have an enzyme system that can detoxify harmful by-products. This includes catalase, peroxidase etc.

The value of Eh can be controlled by vacuum packaging, skin tight packaging.

Extrinsic Parameters: These parameters refer to the factors involved in processing, handling of food etc.The various extrinsic parameters contributing to food spoilage are:-

- Temperature.
- Humidity.
- Atmospheric conditions.
- Processing, hygiene, cleaning.

Temperature: The spoilage microbes of food have been found to grow from - 10°C to 80°C. Commonly, mesophiles grow from 20-45°C, psychotrops (-5 to 35°C) and thermophiles (40-80°C). However, most of the pathogens are mesophilic. The aW, pH_2,pO_2 of storage temperature also play an important role in spoilage. At -18°C,almost all microbes are inhibited. However, gram –ve organisms are more sensitive at this temperature although Salmonella may survive.

Atmospheric conditions: An increase in CO_2 concentration and decrease in O_2 concentration is reported to inhibit aerobic microbes and moulds. The modified atmosphere generally called Modified Atmosphere for Packaging (MAP) can have an influence on food spoilage. Modification of atmosphere can be done by active or passive methods.The active methods include vacuum in packaging and using O_2 adsorbent while passive effects are brought about by respiration of microbes in the product.

Humidity: The packaging of the foods should be moisture proof. Any fresh food loses slight water during storage. Products with low aw stored in humid conditions, absorb moisture and go mouldy. The chilled foods, if exposed to warm damp air show moisture condensation on foods leading to rapid bacterial growth.

Processing, hygiene and cleaning: The raw material always contains micro flora. This can be reduced by washing, sorting and peeling, good hygiene practices and cleaning by good quality water. On the other hand, mincing and putting additives increase microbial number. The chilled minced meat having low aw, high O_2 and high Eh has been found to be rich in Pseudomonas & Acinetobacter.

Implicit Parameters: In addition to intrinsic and extrinsic parameters, implicit parameters like growth and reproduction rate, generation time and association between spoilage microbes are important. Dominant microbes grow faster than others.

If aW is >0.98 and pH > 4.5, bacteria predominate as spoilers. Interactions exist between microbes due to utilization of nutrients, alteration in pH, alteration in Eh, alteration in aW and production of metabolites like antibacterial substances or vitamins that affect the type of microflora in the food.

Types of Spoilage Microbes

Bacteria: They are the most abundant microbes in nature and a variety of them can spoil different kind of food items. The common type of bacteria that can spoil food are: -

- Psychrotrophs., Thermoduric, Mesophiles, Thermophiles, Thermoduric vegetative bacteria.
- Gram –ve rods.
- Gram +ve spore formers.
- Lactic acid bacteria.
- Gram +ve vegetative bacteria.

Lactic acid Bacteria: They cause souring of foods and can grow even at chilling temperature eg.Lactobacillus, Streptococcus, Leuconostoc.

Moulds: They develop as multicellular structures visible to naked eye and generally grow from spores present in air. They grow as fluffy mass, prefer moisture and temperature of 20-40°C. They are active at refrigeration temperature but are destroyed above 70°C. They prefer acidic pH for growth. Food with fungal growth may appear safe to eat since growth is limited mainly to surface but harmful substance produced may be present in the entire food and therefore it should not be consumed. The growth of molds is generally accompanied by production of enzymes that breakdown food and cause spoilage. In addition to this, mycotoxins may also be produced.

Other moulds leading to food spoilage are from genera Tricothecium, Cephalosporium , Diplodia, Neurospora, Cephalosporium and Chrysosporium.

Yeast: They are unicellular microbes resembling fungi, larger than bacteria, oval, elliptical and 5-8?m in diameter or larger. They divide by budding or fission, grow at highly acidic pH, high alcohol and sugar concentration. Some yeast grow as red or pink coloured microbes.

INTEXT QUESTIONS

I. Short Questions

1. What are the causes of spoilage
2. Write a list of various types of fermentations
3. List the various types of spoilage microbes

II. Essay Questions

Discuss the Intrinsic and Extrinsic parameters responsible for spoilage

UNIT - 12

FOOD PRESERVATION

Food preservation or food processing is a method to protect food from spoilage due to microbial growth, and to preserve food for a longer time. To prevent microbial contamination, to kill pathogens and to minimize food spoilage and food poisoning. Food Preservation Methods are classified into 3 categories:

1. **Physical methods**: Pasteurization, sterilization, refrigeration, freezing, canning, drying / dehydration.
2. **Chemical methods:** Salting, sugar, marinating, natural and artificial, additives.
3. **Biological methods:** Fermentation, cheese, wine, vinegar, and beer.

I. PHYSICAL METHODS

1) **PASTEURIZATION:** is a mild heat treatment of liquid foods (both packaged and unpackaged) where products are heated to below 100 °C. The heat treatment and cooling process are designed to inhibit a phase change of the product. The acidity of the food determines the parameters (time and temperature) of the heat treatment as well as the duration of shelf life. Parameters also take into account nutritional and sensory qualities that are sensitive to heat.

   In acidic foods (pH <4.6), such as fruit juice and beer the heat treatments are designed to inactivate enzymes and destroy spoilage microbes (yeast and lactobacillus), low pH of foods, pathogens cannot grow. In less acidic foods (pH >4.6), such as milk and liquid eggs, the heat treatments are designed to destroy pathogens and spoilage organisms (yeast and molds). Not all spoilage organisms are destroyed under pasteurization, so subsequent refrigeration is necessary.

   High-temperature short-time (HTST) pasteurization, such as that used for milk (71.5 °C (160.7 °F) for 15 seconds) ensures safety of milk and provides a refrigerated shelf life of approximately two weeks. In ultra-high-temperature (UHT) pasteurization, milk is pasteurized at 135 °C (275 °F) for 1–2 seconds, which provides the same level of safety, but along with the packaging, extends shelf life to three months under refrigeration.

(2) STERILIZATION: Sterilization processes are more severe with respect to heat treatment given generally to achieve commercial sterility. Obviously, these products will be subjected to a nutrient loss. The following nutrients are more sensitive to destruction by heat: vitamins A, B_1, B_6, B_{12}, C, D, E, folic acid, inositol, and pantothenic acid, and amino acids such as lysine and threonine. Because of the possibility of using numerous (infinite) time temperature combinations for achieving thermal sterilization, the influence of the process cannot be easily quantified. The severity of the heat treatment is determined by the pH of the food (low-acid foods require more severe heat treatment to ensure the destruction of *C.botulinum*, the composition of the food (protein, fats, and high concentrations of sucrose increase the heat resistance of microorganisms), the heating behavior of the food (conduction, convection); the nature, size, and shape of the container; as well as the nature and mode of application of the heating medium. Agitation during processing offer additional variables to optimize the process.

(3) BLANCHING: Steam and hot water blanching are the two most commonly used blanching techniques. Steam blanching, is possible to reduce the effluent volume, and leaching losses. The vegetables are heated in single layers to a temperature high enough to inactivate the enzymes. In blanching, nutrient loss can be up to 40% for minerals and vitamins (especially vitamin C and thiamin), 35% for sugars, and 20% for proteins and amino acids. Blanching can result in color changes. Alkaline pH and chelating agents, help in retention of green color. Texture degradation is characteristic of most heat treatments, low-temperature blanching improves texture (carrots, beans, potatoes, tomatoes, cauliflower).

Factors Affecting Growth and Survival of Microorganisms in Foods

a) **pH and buffering capacity:**

b) Antimicrobial Constituents Act as Barriers: Essential oils in spices;casein lactoferrin, lactoperoxidase and lysozyme in milk; ova transferrin, avidin, lysozyme and Ovo flavoprotein in egg, hydroxycinnamic acid derivatives in fruits, vegetables, tea and other plants possess antibacterial and antifungal activity. Natural covering of foods like shell of eggs and nuts, outer covering of fruits, hide of animals provide protection against entry and subsequent spoilage by microorganisms.

c) Extrinsic Parameters: Temperature of Storage Microorganisms have been found growing virtually in all temperatures. A particular microorganism will exhibit a range of temperature over which it can grow, defined by three points. Ex. organisms with an optimum temperature 37°C are mesophiles. with temperature between 45°C and 70°C are thermophiles and psychrophiles grow at 0°C. In food microbiology mesophilic and psychotropic organisms are important.

d) Relative Humidity of Storage Environment: There is a relationship between temperature and humidity, higher the temperature, lower is the relative humidity and vice-versa. Foods that undergo surface spoilage from molds, yeasts and some bacteria should be stored in conditions of low humidity, by proper wrapping of food.

e) Gaseous Atmosphere: The inhibitory effect of CO_2 on the growth of microorganisms is applied in modified atmosphere packaging of foods. The storage of foods in atmosphere containing 10% of CO_2 is —Controlled Atmosphere used in case of apples and pears. Some yeasts also show considerable tolerance of highCO_2 levels and dominates spoilage microflora of carbonated beverages. CO_2 tends to decrease pH of foods inhibitingmicroorganisms' growth.

f) Thermal Death Time: It has been found that microorganisms, including C. botulinum, are destroyed by heat at rates which depend on the temperature, higher temperatures killing spores more quickly. At any given temperature, the spores are killed at different time durations, some spores being apparently more resistant to heat than other spores. If a graph is drawn, the number of surviving spores against time of holding at any chosen temperature, it is found experimentally that the number of surviving spores fall asymptotically to zero.

An enzyme present in milk, phosphatase, is destroyed under somewhat the same time-temperature conditions as the M. tuberculosis and, since chemical tests for the enzyme can be carried out simply, its presence is used as an indicator of inadequate heat treatment. In this case, the presence or absence of

phosphatase is of no significance so far as the storage properties or suitability for human consumption are concerned.

The processes for sterilization and pasteurization illustrate very well the application of heat transfer as a unit operation in food processing. The temperatures and times required are determined and then the heat transfer equipment is designed using the equations developed for heat-transfer operations.

IV. FOOD DRYING/ DEHYDRATION

Dried foods can be stored for long periods without deterioration. Drying processes is categorized into three categories:

1. **Air and contact drying under atmospheric pressure:** In air and contact drying, heat is transferred through the foodstuff either from heated air or from heated surfaces. The water vapour is removed with the air.

2. **Vacuum drying:** In vacuum drying, evaporation of water occurs more readily at lower pressures than at higher ones. Heat transfer in vacuum drying is generally by conduction, sometimes by radiation.

3. **Freeze drying:** In freeze drying, water vapour is frozen. The food structure is better maintained under these conditions. Suitable temperatures and pressures must be established in the dryer to ensure that sublimation occurs.

   (i) Heat requirements for vaporization: The energy, which must be supplied to vaporize the water at any temperature, depends upon this temperature. The quantity of energy required per kg of water is called the latent heat of vaporization, if it is from a liquid or latent heat, if it is from a solid it is sublimation.

   (ii) Dehydration/ drying: The rate of drying is generally determined by the rates at which heat energy can be transferred to water or to ice in order to provide the latent heat, though under some circumstances the rate of mass transfer (removal of the water) can be limiting. All three of the mechanisms by which heat is transferred - conduction, radiation and convection - may enter into drying. The relative importance of the mechanisms varies from one drying process to another and very often one mode of heat transfer predominates to such an extent that it governs the overall process.

   In cases where substantial quantities of heat are transferred by radiation, it should be remembered that the surface temperature of the food may be higher than the air temperature. Estimates of surface temperature can be made using the relationships developed for radiant heat transfer although the actual effect of combined radiation and evaporative cooling is complex. Convection coefficients also can be estimated using the standard equations.

   For freeze drying, energy must be transferred to the surface at which sublimation occurs. However, it must be supplied at such a rate as not to increase the temperature at the drying surface above the freezing point. In many applications of freeze drying, the heat transfer occurs mainly by conduction.

   As drying proceeds, the character of the heat transfer situation changes. Dry material begins to occupy the surface layers and conduction must take place through these dry surface layers which

are poor heat conductors so that heat is transferred to the drying region progressively more slowly.

(iii) Drying and water activity: Dehydration accomplishes preservation in two major ways. First, it removes the water necessary for the growth of microorganisms and for the enzymatic activity. Second, by removing the water, it increases the osmotic pressure by concentrating salts, sugars, and acids, creating a chemical environment unfavorable for the growth of many microorganisms. The microbial stability of dehydrated foods results from the interruption of vital processes essential to microbial growth or spore germination. The number and types of microorganisms that can be associated with foods are extremely large.

A dehydrated product remains stable only when it is protected from the subsequent exposure to the surrounding environment (e.g. water, air, sunlight and contaminants). Hence, appropriate packaging of a dried product is an important consideration.

(iv) Cooling and Freezing: In freezing, there will be an initial drop in the temperature of the product from its initial level (usually at a temperature above its freezing point) until it reaches its initial freezing point..

Freezing is a phase of transition where a liquid turns into a solid when its temperature is lowered below freezing point. The temperature of the product remains relatively steady as the latent heat is removed. For food products, rather than a constant temperature, it slowly drops until the majority of water is frozen as ice and then drops more rapidly as the ice temperature is lowered further. The different methods of freezing are generally grouped as :

1. Air freezing 2. Plate freezing 3. Liquid immersion freezing 4. Cryogenic freezing.

Air freezing: Is a common method of commercial freezing. The material, packaged or unpackaged, is frozen by exposure to air at temperatures ranging from -18 to -40ºC, freezing in a room under very slow air circulations. The slow cooling of the product might also allow some of the undesirable activity of enzymes and microorganisms prior to the completion of freezing. When the Product is placed on conveyor. It is termed as “tunnel” freezer.

Plate freezing: In this type of freezer, the food, generally in regular-sized packages, is frozen by contact with a metal plate, which is cooled either by circulating cold brine or refrigerant. Generally, double contact plates are employed between which the packaged products are sandwiched under a slight pneumatic pressure, which provides a good contact between the package and the contact surface. Heat transfer occurs from both sides of the package. This has some advantages over the air-freezing technique by way of minimizing moisture loss from the product during freezing.

Liquid-immersion freezing: As the name indicates, this technique involves immersion of the product, packaged or non-packaged, in the cooling medium. The process is relatively fast, because heat transfer from direct contact liquid medium is much more efficient than from air. Aqueous solutions of propylene glycol, glycerol, sodium chloride, calcium chloride, and sugars have been tried (for example, in the freezing of orange juice concentrates).

Cryogenic freezing: Cryogenic freezing provides for a very rapid freezing by exposing to very low temperatures of the cooling medium. Liquid nitrogen and liquid or solid carbon dioxide are common

cryogenic freezing agents. In this procedure, the product is generally conveyed through the freezing chamber by way of a tunnel. As the product enters, it will meet the emerging vapors of the nitrogen gas at about-30 to -40 ºC, which pre cools the product. The product is frozen in the freezing chamber at the center of the tunnel, with a brief exposure to a spray of liquid N_2. The conveyor speed determines the contact time. Following this, the product will flow out along with the vapors of N_2, where is gets equilibrated to the desired finishing temperatures.

5. Canning involves several steps they are:

1. Selection of food: Fresh, firm fully developed evenly matured fruits or food is selected
2. Washing: Washing of fruits and vegetables dust free
3. Blanching: All vegetables /fruits are blanched (final cleaning operation) it softens the tissues and inactivates enzymes that can cause undesirable changes
4. Filling of cans: Food is automatically filled by machines with accompanying liquid (brine or sugar syrup) filled cans are passed through hot water or steam, to drive away air, cans are closed and then sealed, then sterilized to destroy microorganisms
5. Sealed cans are dipped in cold water or air, then labelled.

II. CHEMICAL METHODS

Many chemicals are used today in the preservation of foods. They range from very simple substances such as salt and sugar, to complex compounds such as benzoates. The following table lists some of the most common chemical preservatives used today and the foods that they are used in. These chemicals have been deemed GRAS (Generally Regarded As Safe) in the amounts that are specified.

Table 23: Common Chemical Preservations

Chemical	Amount GRAS	Organism(s) affected	Use in Foods
Sulfites	200 - 300 ppm	Insects & microorganisms	Dried fruits, wine, lemon juice
Dehydroacetic acid	65 ppm	Insects	Strawberries
Sodium nitrite	120 ppm	Clostridia	Cured Meats
Ethyl formate	15 - 220 ppm	Yeasts & molds	Dried fruits and nuts
Propionic acid	0.32%	Molds	Bread, Cakes, Cheeses
Sorbic acid	0.2%	Molds	hard cheeses, cakes, Salad dressings
Benzoic acid	0.1%	Yeasts & molds	Margarine, relishes, soft drinks and ketchup.

The chemicals listed have complex mechanisms by which they inhibit their target organisms.

Salt and Sugar Preservation: Most microorganisms cannot live in a relatively dry environment. When a microbe is in a non-saline environment, available water can pass through the membrane of the microbe easily. If we add salt to the water to make a saline environment, this creates an isotonic condition for the cell. It means that there is more water moving out of the cell than moving into the cell. This results in slower growth for the microbe or even death. Because of the drying effect of salt it has been used for thousands of years. It usually takes about 20% salt to inhibit microbes. However, there are some microbes that can survive high salt concentrations. Sugar has the same mechanism as salt, but it takes much more sugar (~6X) than salt to produce the same effect.

Other Preservatives: The chemical preservatives have a direct effect on organisms. However, there are other chemicals that have a preservative effect without directly targeting an organism. These include antioxidants, flavoring agents, and spices. Other direct chemicals include antibiotics and antifungals.

Use of chemical preservatives is guided by the law of the land where it is manufactured and/or intended to be sold. The legal requirements vary from nation to nation. Except salt, sugar and vinegar which are naturally occurring substances, the upper limit of other permitted chemicals are guided by the law. Also, there are strict guidelines governing labelling of foods preserved by chemicals. The general perception is that addition of chemicals can be detrimental to human health over long periods and hence this method is avoided as far as possible.

Minimal Processing of Fresh Foods: The concept of minimal processing applies mostly to vegetables, fruits and juices. The principles and applications of Hurdle theory are used together with the development of emerging techniques for the minimal fresh processing or fresh-cut industry to improve the quality, safety and shelf-life of plant-derived commodities in order to satisfy increasing consumer demand.

Other Emerging Techniques

- Modified atmosphere packaging (MAP) It is well known that MAP has been successfully used to maintain the quality of minimally fresh processed fruits and vegetables. MAP technologies that allow an extension of the shelf-life are much demanded by producers and distributors. It was observed that exposure to high O_2 alone did not strongly inhibit microbial growth and the results were highly variable.

- The development of new packaging materials will allow definitive avoidance of anaerobic conditions and a reduction in respiration rate, ethylene emissions, browning as well as weight loss in order to keep the fresh properties of minimally fresh processed fruits and vegetables longer, attenuating undesirable changes in sensory quality and controlling microbial growth. It is known as 'active' and 'smart' packaging, which responds actively to changes in the food package. As an example, smart packaging can now include materials designed to absorb or emit chemicals during storage, thereby maintaining a preferred environment within the package which maximizes product quality and shelf-life.

- **Genetic Engineering:** The possible use of genetic engineering to develop higher production and more resistant plant foods (GM Foods) is relatively well known. Currently, this technology is being used to introduce desirable attributes such as improved colour, aroma, flavour and taste of different fruit and vegetable products. In fact, the first transgenic product introduced as a food commodity was a tomato with reduced polygalacturonase activity. Although the huge advance of

these techniques was in the last decade, there is still a lack of published information about the development of genetically modified fruit and vegetables which overcome some relevant problems of the post-harvest science such as chilling injury resistance, longer storage duration and pathogen resistance.

III. BIOLOGICAL METHODS OF PRESERVATION:

Fermentation is a metabolic process that releases energy from sugar or other organic substrates through various enzyme actions. It is a type of anaerobic biochemical process.

Here, microorganisms such as fungi and bacteria are intentionally used for fermentation to make end products that are beneficial to humans. Common chemicals used citric acid, acetic acid and ethanol are made by industrial fermentation.

Fermentation is among the traditional methods for preserving food.

- Fermentation prolongs the shelf-life of food items.
- The term"Fermentation " refers to both aerobic and anaerobic breakdowns that occur in carbohydrates and carbohydrate like materials.
- Fermentation is a process that encourages multiple microorganisms, and their metabolic functions are also boosted. In this way, microorganisms breakdown complex organic compounds into simpler compounds when they are in anaerobic or aerobic conditions.
- The chemicals created by microorganisms, such as acid or alcohol cause the preservative effects of fermentation through slowing down spoilage-related factors.
- The most important chemical compounds involved are the acids (especially lactic acid) as well as alcohol. They inhibit the growth of the common pathogenic bacteria in food.
- Some examples of food that is preserved by fermentation include alcohol products (e.g. beer, beer or fruit wine) as well as acid products (e.g. vinegar or pickled vegetables) such as yogurt, cheese, etc. This method is usually coupled with pasteurization.

Types of Fermentation

1. **Anaerobic conditions:** In production of cheese, due to Streptococcus lactic bacteria the enzyme lactose converts to lactic acid in an anaerobic state.
2. **Aerobic condition: i**n the production of vinegar because of Acetobacter bacteria, ethyl Alcohol is converted to acetic acid in an aerobic state.

Foods Produced by Fermentation

1. **Alcoholic Beverages**

   Wine: Yeast is found on the grape's skin. The fermentation process begins when yeast reacts with sugars from grapes, converting the sugars into alcohol.

   Beer and Alcohol: They contain malted cereals, which are fermented by yeast and produce 37% alcohol. The yeast type as well as the quantity of the yeast and the fermentation temperature determine the amount of alcohol produced.

2. **Vinegar Preparation:** With oxygen, Acetobacter bacteria transform alcohol into Acetic acid. Vinegar can be made using carbohydrate sources such as fruits and cereals.
3. **Cheese Production:** Streptococcus lactis bacteria converts the sugar in milk into the lactic acid The acid curdles milk and turns it into cheese.
4. **Citric acid Production:** Citric acid is derived from mould, yeast, and the bacteria. It is utilized to make fruit drinks.

Uses of Fermentation

- Fermentation can extend the shelf life of food items.
- It increases the growth of microorganisms which produce alcohol and acid.
- It stops development of lipolytic as well as proteolytic microorganisms.
- Vinegar that is made by fermentation is of industrial significance.
- Hurdle Technology: Combination of Two or More of the Above methods.
- Hurdle or barrier concepts are founded on synergistic effects of preservatives as well as other methods to preserving food.
- The higher the hurdle, the greater is the impact.
- The measurement of different factors with respect to pH redox-potential temperature, water activity and preservatives, etc. determines the level of success combinations of obstacles that result in the failure of growth and, ultimately, deaths of bacteria.
- Hurdle technology is a great way to provide food products that are shelf-stable that is of superior quality and fresh characters.

INTEXT QUESTIONS

I. Short Questions

1. Discuss various methods of Physical methods of preservation.
2. What is fermentation? What are its benefits?

II Essay Questions

1. Discuss the various chemicals used in preservation.

III. Activity

Observe the various foods preserved at home and give one each example of the method of preservation discussed above.

UNIT - 13

FOOD PACKING

Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sale and use. Packaging can be defined as a tool that protects and contains goods with the aim of minimizing the environmental impact of consumption. Ideal packaging is like that of a banana, orange peel, coconut and eggshell- packaging provided by nature.

Definition of Packaging

The Packaging Institute International (PII) defines packaging as the "enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container form to perform one or more of the following functions: containment, protection, preservation, communication, utility and performance".

The device or container which performs one or more of these functions, it is considered a package.

Food packaging is defined as enclosing food to protect it from tampering or contamination from physical, chemical, and biological sources, with active packaging being themost common packaging system used for preserving food products - Robertson.

Need for Packaging of Foods

- Physical protection - From shock, vibration, compression, temperature, etc.
- Barrier protection - From oxygen, water vapor, dust, etc., Package permeability is a critical factor in design. Keeping the contents clean, fresh and safe for the intended shelf life using desiccants or oxygen absorbers or use of modified or controlled atmosphere is a primary function.
- Containment or agglomeration - Small objects are typically grouped together in one package for reasons of efficiency. For example: Liquids, powders, and flowables need containment.
- Information transmission - Information on how to use, transport, recycle or dispose of the package or product pharmaceuticals, food, medical and chemical products require legislation.
- Marketing - Packaging can be used to encourage buyers to purchase the product by attractive communications and graphic design that are applied to the surface of the package.
- Security - Packaging can play an important role in reducing the security risks of shipment. Packages can be made with improved tamper resistance to deter tampering and also can have tamper-evident features to help indicate tampering. Packages may include authentication seals to help indicate that the package and contents are not counterfeit.

  Packages can include anti - theft devices, such as dye-packs, Radio Frequency Identification (RFID) tags, or electronic article surveillance tags, that can be activated or detected by devices at exit points.
- Convenience - Packages can have features which add convenience in distribution, handling, display, sale, opening, reclosing, use and reuse.

- Portion control - Single serving or single dosage packaging has a precise amount of contents to control usage.

Types of Packaging

Individual Packaging: Packaging of individual items include application of appropriate material and container, etc. to protect each individual item of goods, or to increase the merchandise value as well as the conditions of the goods to which those techniques are applied. This could also be called as Primary Packaging.

Inner Packaging: Technique of application of appropriate materials ,container, with protection of goods against water vapour, light, heat, impact, condition of goods to which these techniques have been applied. This could also be called as Secondary Packaging.

External Packaging: This indicates the outer packaging of packed goods, (eg. box, bag or other container, a barrel or can or bundling) without the use of container. This is Tertiary Packaging.

Choosing an Appropriate Packaging Material:

- Specific sensitivities of the contents, e.g. moisture, oxygen, temperature, RH, pH,
- Weight and shape of container, effect on filling and sealing.
- Storage conditions- How long the product needs to be protected.
- Bio-degradability and recycling potential.
- Appropriate measures for transportation over long distances.
- For Dairy and fruit products utmost care is needed in its preservation during storage, handling and transportation.
- There are other aspects to be identified under the following headings for determining the packaging of processed food products. Product range, Market, Consumer needs, Operating margins.

Packaging and Consumer needs: In deciding the type of packaging, consumer trends play a vital role. Some of the trends in the food industry in India are: Packaging is expected to make food products safe. Younger generation shift towards health and wellness foods and beverages, preference for novel foods.

Additional Attributes to Consumers: Product quality and protection with a great emphasis on freshness. Easy to open, dispense, reseal and store. Product should be Appealing, Durable, eco friendly , leak and spillage proof .

Packaging Materials for Different Food Products:

Table 24: Food Products and Packaging Materials.

Product	Packing material	Packing Material	Product
Milk, Ghee	LDPE/LLDPE laminate	Spices	PET/PolySaly
Milk Powder, Baby malted food	Tin cans with alu foil	Salt	LDPE
Chocolate bars	Alu Foil/Poly laminate	Potato chips	Poly/ foil
Confectionery/candy	Paper wax,PET,Poly	Juices	Foil/Poly
Edible oils	3/5,layer nylon films	Tea, Coffee	Poly paper
Vanaspati	LDPE/LLDPE laminate	Biscuits	Wax coated paper, Alu.foil

Packaging Materials

The packaging material used for food products can be classified as Flexible, rigid and semi rigid, they are card board, plastic, Carton, Glass, Metal.

Flexible Packaging Materials: These materials are not rigid. They are soft and elastic in nature

Paper and Paper Board: Have properties like high stiffness, high bending resistance and less water absorption. Paper is used for packaging because it is flexible easy amenable for printing, forcoating, temperature resistant, used for recycling, has good insulator properties, could be manufactured with high brightness properties and Compatibility with other packaging materials for lamination, High stiffness properties, amenability to fabricate folding cartons, display carton.

Aluminum Foils: Is available as free unsupported, unlaminated or laminated film, plain, coloured, coated, lubricated and embossed forms they are Impermeable, Non Toxic, Stable, Light and heat barriers and tasteless and Odorless. It can be used as sealing surface in the used for lamination due to impermeable properties.

Plastic Materials: Plastic material is solid at ordinary temperatures and allows appreciable and permanent change of form without losing its coherence on the application of pressure and heat Plastic materials are mostly used in packaging. Some thermoplastic materials which got extensive application in packaging are polyethylene, polypropylene, polyvinyl chloride, polyester, nylon or polyamide, polystyrene.

Rigid Packaging Material: Metal container, Glass bottles,plastic bottles, corrugated Fiber board boxes are used for packaging for all processed food products including dairy products.

Glass Containers: Used for packaging dairy products.

Metal Containers: Metal containers are made from aluminum, tinplate or tin free steel.

Metal Cans: protect from moisture, oxygen,gas. Amenable to print with multicolor decoration, provides longer shelf life to dairy products, High impact strength to withstand stress during transit and Lighter in weight as compared to glass container.

Plastic Containers: Plastic containers are used as an alternate rigid packaging materials for the packaging of dairy products mainly milk powder and ghee.

Corrugated Fiber Board Boxes: The corrugated Fiber board is converted into corrugated Fiber board boxes .

Advantages of Corrugated Fiber Board Boxes: Availability of raw materials Kraft paper and adhesive, The technology of box making is simple. Availability of box making machineries, Cost effective. Amenable to make display package. Tare weight of box is less resulting to the reduction of freight cost. Maximum utilization of storage space due to collapsing nature of boxes. Recognised as Eco-friendly packaging material. Facilitates to have excellent printing on the outer surface of the boxes. Easy to handle in the shop floor due to collapsing nature as compared to wooden box.

Semi-rigid Packaging Materials: Are neither rigid nor flexible in nature. The important packaging materials under this category are discussed below

Folding Carton: The folding cartons are primarily made from duplex board or triplex board. They are amenable to number of colour printing, ease of handling, distribution and storage at retail outlet under refrigeration, amenable to make pilfer proof closing device, stiffness nature of folding, carton facilitates to stack the product easily, empty cartons provide excellent space utilization due to collapsing in nature. other types are lined cartoon, aseptic carton, thermosformed containers

Forms of Packaging : Metal cans, Glass bottles, Stretch-wrap packaging, Flexible pouches, Bag-in-box packages, Cups/trays, Paper-board containers.

Food and Package Interactions with Surrounding Environment: Exposure to oxygen can cause deterioration of many foods due to oxidation of lipids and other oxygen-sensitive components such as aromas, colors, and vitamins.

Water Vapor: The water activity affects food stability the relative rates for a number of chemical reactions, enzyme activities and microorganism growths that lead to food deterioration.

Aroma: Undesirable interactions of food with environment may include the possibility of loss or gain of aromas, it reduces the fresh character of food.

Packaged Food Interaction with Light: Solid foods are least sensitive to light, but not liquid foods.

Packaged Food Interaction with Physical Stresses: Food physical deterioration can result from bruising, deformation, breakage, or abrasion due to subjection of food to compression, shock, or vibration. Bruising of fresh fruits, vegetables, meat, poultry, and seafood can lead to chemical and biological deterioration. Rigid and semi-rigid packages protect food from compression damage.

Thus, primary flexible packages of food are often placed in semi-rigid or rigid secondary packages. All packages, including flexible packages, limit shock and vibration damage to the extent they restrict movement of the food. Beyond protecting food from physical deterioration, the packaging must maintain

its integrity to provide its other functions. Failure of the packaging material will result in foodcontamination from soils and microorganisms, as well as increased interactions with the atmosphere.

Packaged food interaction with packaging materials: Varying degrees, all materials used for food packaging have been found to interact with food in one or both ways. Eg. plastic monomers and plasticizers, paper coating and adhesive components, metals and metal coatings and glass component ions.

Some Modern Packaging Concepts: Packaging, like food processing, is a multi-disciplinary subject, as a result, the packaging scenario in the commercial food business undergoes periodic upheavals causing the packaged product quality to improve accompanied normally by lower costs and better product handling convenience. Some of the recent packaging systems and concepts are "form, fill and seal (FFS)" system, aseptic packaging system, retortable pouches, modified atmospheric packaging (MAP), active packaging systems and intelligent packaging systems.

INTEXT QUESTIONS

I. Short Questions:

1. What is the purpose of packaging a product?

List the foods and the packaging material used.

II Essay Questions:

1. Discuss the various types of packaging materials used

III. Activity:

Go to nearby super market and observe packaging of following foods:

Milk and its products

Biscuits

Confectionary items

UNIT - 14

LABELING

Labeling is an important part of marketing a product. Labeling is essential as it helps to attract the attention of customer and give the genuity of the product. It can be combined with packaging and can be used by marketers to encourage potential buyers to purchase the product.

Label: Label contains information about the item being labeled. It can be an informative, descriptive, or pictorial label like a tag, mark, or brand that is attached to a product or any item. It provides detailed and relevant information about the product so that it can be easily recognized or distinguished by customers.

Food labeling: Information presented on food label, is one of the most important and direct means of communicating information to the consumer.

Big companies and manufacturers have pre-made labels which are attached automatically to their products. But for e-commerce, offices and small businesses, they start making their own custom labels. Labels include barcodes, nutrition facts, mailing labels and others.

Labels are used for bulk mailing, shipping and other applications that require systematic organization. Packages and labels communicate how to use, transport, recycle or dispose of the package or product. Label is used for identification. It helps a viewer to differentiate the product from the rest in the shelves of the market, helps to spread awareness among the customers about the item they are consuming and labeling also helps to identify ingredients. Labelling is used to exaggerate the product. Labeling should also contain information relating to whether the product has harmful chemicals, especially if it is a product that is meant for children.

Labeling can also be beneficial for the warehouse as they can provide information on how the product should be handled.

There are four types of labels:

1) Brand Labels: Contain the brand name of the product . They provide details about the product brand and can either be removable or not. Examples are clothing labels and soap labels. Custom labels for the clothing industry and soap manufacturing companies reinforce the brand and help communicate a specific message to their customers.

2) Informative Labels: Provide product information like manufacturer's name, expiry dates, intermediaries, and additional instructions on the product's usage.

3) Descriptive Labels : Mostly contain information about how to use the product such as handling, security, storage, these are used for products with grades that cannot be differentiated.

4) Grade Labels: Describe the product's features. It shows the product's grade or quality in figures, letters, or words. Examples of grades are: A, B, C, D or 1, 2, 3, 4 or Good, Better, or Best Benefits of Labels.

Labels Provide Information: Customers can get information like product's nature, price, quality, before buying , which makes buying process easier and faster.

Pharmaceutical and cosmetic products may cause allergic reactions. Labels provide details about the product's composition so that customers will know whether it contains ingredients that they are allergic too. When it comes to medicinal products, labels provide information for their safe use to avoid complications. Labels also warn customers about harmful chemical content which can be dangerous to children.

Label can help customers recognize fake products by discriminating between labels of different products. A poorly-labeled product will most likely not be chosen compared to a professionally labeled one. Labels provide crucial instructions on the usage, disposal, and recycling process of products, which helps to avoid problem such as poisoning.

Helps Customers Compare Goods: They help in identifying and comparing product labels to differentiate between product brands for making better purchasing decisions.

Labels help to attract potential buyers by creating eye-catching labels. Most of the time, the decision of consumers whether to buy a product or not is greatly influenced by how attractive the product label and packaging is made.

Labels Help Consumers Choose Healthier Options: Nutrition Facts table on food and beverages help customers have healthier options.

Organized Product Categorization: Grade labels are helpful in categorizing large product varieties for different customers.

Labels Ensure Accuracy and Efficiency of the Supply Chain: Accurate labels can help in the efficiency of supply chain by preventing shipping counterfeit products. from entering the chain.

Requirements for Labeling: Labelling directions are given in Fair Packaging and Labeling Act (FPLA) and Federal Food Drug Cosmetic Act (FDC Act). Requirements for food, beverage, cosmetic products.

- Product name, Name and location of the manufacturer, packer, or distributor, license code.
- Ingredients, Nutrition Facts ,Food allergens, Food additives/chemicals used, Net contents in both metric and U.S. Customary System terms, English labels, Date of manufacture and date of expiry.

All foods have to list seven food components on their nutritional information panels – energy (kilojoules), protein, total fat, saturated fat, total carbohydrates, sugars and sodium. Manufacturers might decide to include other nutrients too.

Under EU Regulations, food labels should give information about the food inside the packaging, shelf life and storage instructions. Food labels should also show an ingredients list with the most common allergens clearly emphasised so they stand out from other ingredients.

Allergen labelling: Food producers must emphasise allergens within the ingredients listed on the label of pre-packed foods. To do this, they might: use bold, underline or italics, change the colour of the text , There are 14 specified substances or products causing allergies or intolerances which must be highlighted. They are cereals containing gluten, crustaceans - including prawns, crabs, lobster and crayfish, peanuts, eggs, fish, nuts - brazil nuts, pistachios, almonds, hazelnuts, walnuts, pecans, cashews and macadamia nuts, soybeans, milk, celery, mustard, sesame, lupin, molluscs - including clams, mussels,

whelks, oysters and squid, sulphur dioxide/sulphites (a preservative found in some dried fruit) - but only when present in concentrations over 10 mg/kg or 10 mg/l. Statements like "Contains nuts" or "Contains shellfish" are not allowed on food labels.

Nutrition Labelling: Is mandatory for pre-packed foods to display a nutrition declaration for the product. This is usually referred to as back of pack nutrition labelling. They include.

Calories and Reference Intake (RI) Nutrition labels must display the amount of energy (calories and kilojoules) and the amount of fat, saturated fat, carbohydrates, sugars, proteins and salt (all expressed in grams) present in 100g (or 100 ml) of the food. In addition, nutrition information may also be expressed per portion provided the number of portions present in the pack is quoted.

Energy: The amount of energy in foods and drinks must be shown in kilocalories (kcal).

Front of Pack (FOP) Nutrition Labelling: FOP nutrition information using a colour-coded labelling system is to highlight the nutrition content of pre-packaged food and drink. The colours show if the product contains high, medium or low levels of fat, sugars and salt: red means high, amber means medium, green means low. Most labels carry a mixture of red, amber and greens. Try to buy products that are a mixture of amber and greens as these are often healthier choices. The use of plain or single colour labelling is acceptable, providing it does not mislead or confuse the consumer.

Date Labels: Most foods and drinks must be marked with either a 'Use by' or ‘Best before’ date. Use by date, is about food safety and is used on foods that go off quickly, such as: raw meat or fish, cooked sliced meats, dairy products, prepared salads.

Best Before Date: Is about food quality. It will not cause you any harm consuming food and drink after this date, however, it might not look or taste its best.

Storage Instructions: To ensure safety of the product remains safe to eat, follow the storage instructions on labels ('keep refrigerated', 'store in a cool and dry place', 'refrigerate after opening') consume it within the numbers of days given on the label ('once opened, use within 3 days'). When storing food and drink in the fridge, make sure the temperature is below 5°C (use a fridge thermometer).

Agencies which Monitor the International Labeling: FAO works in partnership with WHO to advise the Codex Alimentarius Commission on technical and policy matters related to food labelling. The Codex Committee on Food Labelling (CCFL) is the Codex subsidiary body responsible for setting standards and guidelines on labelling that is applicable to all foods and the Codex General Standard for Labelling of Prepackaged Foods (CXS 1-1985) is the key Codex instrument for delivering information about food to the consumer. The Codex standard is used by countries as guidance for harmonization and has also been used as the basis for new food labelling policies.

Principles for Nutrition Labeling

A. Nutrient Declaration – Information supplied should be for the purpose of providing consumers with a suitable profile of nutrients contained in the food and considered to be of nutritional importance. The information should not lead consumers to believe that there is exact quantitative knowledge of what individuals should eat in order to maintain health, but rather to convey an understanding of the quantity of nutrients contained in the product.

B. Supplementary Nutrition Information – will vary from one country to another and within any country from one target population group to another according to the educational policy of the country and the needs of the target groups.

Nutritional properties including but not limited to the energy value and to the content of protein, fat and carbohydrates, as well as the content of vitamins and minerals. The following do not constitute nutrition claims: (a) the mention of substances in the list of ingredients; (b) the mention of nutrients as a mandatory part of nutrition labelling;(c) quantitative or qualitative declaration of certain nutrients or ingredients on the label if required by national legislation.

C. Nutrient Reference Values (NRVs) are a set of numerical values that are based on scientific data for purposes of nutrition labelling and relevant claims.

D. Quantitative Ingredient Declaration : Certain ingredients will need a quantitative ingredient declaration (QUID).QUID is an indication of how much of the finished product is made up of a certain ingredient; it is always expressed as a percentage.

Not all ingredients will require a QUID. Ingredients will require a QUID in the following circumstances.

The ingredient appears in the name of the food. This applies to all types of name (fancy, customary, descriptive, etc; see 'Labelling of prepacked foods: product name').

The ingredient is commonly associated with the food by consumers. If people think of a certain ingredient as being common to the product, then you must provide a QUID for it. Examples include beef mince in spaghetti Bolognese and kidney beans in chilli con carne.

The ingredient is emphasized in some way on the product. This applies to emphasis in any form, which means that the name of the ingredient (other than in the ingredients list), descriptions of the ingredient, pictures of the ingredient, etc would all trigger the need to provide a QUID.

For example, a strawberry and banana smoothie that has a picture of apples on the packaging would need a QUID for the strawberry, the banana and the apple.

If QUID is not provided, the customer might not be able to distinguish it from products with a similar name or appearance. For example, two brands of tomato ketchup, made up of 50% tomato and 30% tomato respectively. The products may look identical and be priced similarly, so the QUID declaration allows consumers to make an easy comparison between the two products.

Exemptions: In certain circumstances ingredients will not need a QUID even though they meet the criteria above.

The ingredient is used in small quantities for flavouring purposes. For example, Chopped tomatoes with basil and oregano.

Even though the ingredient appears in the name of the food, the amount that is present will not govern consumer choice. A good example of this is garlic bread. Garlic appears in the name of the product and so would normally need a QUID.

Mixtures of fruit, vegetables, mushrooms, spices or herbs where the amounts of each are likely to vary but no one ingredient dominates. These would be declared as 'fruit', 'vegetables',

'herbs', etc in the ingredients list and no QUID given.

Sweeteners, if they only appear in the name of the food because of the requirement to state 'with sweeteners'. However, if you had deliberately brought attention to the fact that you had used a certain type of sweetener ('Now with stevia', for example) - you would need to provide a QUID as normal for the stevia.

Any vitamins and minerals emphasised on the label. Any claim about vitamins and minerals triggers the need for a nutrition declaration, which will include the weight of vitamins and minerals present.

E) Claim: In addition to the FDA-required information on food labels, it's common for them to be peppered with claims about the nutrient content of the food and the purported health benefits of eating it. These claims are marketing tools for food manufacturers, and they're regulated by the FDA in an effort to ensure that they give the consumer accurate, science-based information about the food.

Nutrient Claims Nutrient claims provide straight-forward information about the level of a nutrient or calories in the food, such as "fat-free," "low calorie," or "reduced sodium."

Nutrient claims are regulated by the FDA, with very specific requirements for each one. For example, a food with a "low sodium" claim must have 140 mg of sodium or less per serving, whereas a food with a "reduced sodium" claim must have at least 25 percent less sodium than the standard product. claims such as that a food is "high in," "rich in," and "excellent source of a nutrient, all of which mean that a serving of the food contains 20% DV or more. A "good source of claim contains 10-19% DV of the nutrient.

Health Claims

Health claims are statements on food packaging that link the food or a component in the food to reducing the risk of a disease. Health claims can be "authorized" or "qualified."

Authorized health claims have stronger scientific evidence to back them than qualified health claims. As an example of an authorized health claim, a food that is low in sodium (per the FDA's definition of less than 140 mg per serving) can include the following claim on their packaging: "Diets low in sodium may reduce the risk of high blood pressure, a disease associated with many factors."

Qualified Health Claims have some evidence to support them, but not as much, so there's less certainty that these claims are true. The FDA reviews the evidence for a qualified claim and determines how it should be worded to convey the level of scientific certainty for it. Here's an example of a qualified health claim: "Scientific evidence suggests but does not prove that eating 1.5 ounces per day of most nuts [such as name of specific nut] as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease.

NUTRIENT DECLARATION

1. Application of nutrient declaration

Nutrient declaration should be mandatory for all prepackaged foods for which nutrition or health claims, as defined in the Guidelines for Use of Nutrition and Health Claims (CXG 23-1997), are made.

Nutrient declaration should be mandatory for all other prepackaged foods except where national circumstances would not support such declarations. Certain foods may be exempted for example, on the basis of nutritional or dietary insignificance or small packaging.

2. Listing of nutrients

Where nutrient declaration is applied, the declaration of the following should be mandatory:

Energy value and the amounts of protein, available carbohydrate (i.e. dietary carbohydrate excluding dietary Fiber), fat, saturated fat, sodium 5 and total sugars, and the amount of any other nutrient for which a nutrition or health claim is made, and the amount of any other nutrient considered to be relevant for maintaining a good nutritional status, as required by national legislation or national dietary guidelines.

I. Principles and Criteria for Legibility of Nutrition Labelling

1. General Principles

In the case of nutrition labelling whether applied on a mandatory or voluntary basis it is recommended to follow Specific features of presentation which is intended toenhance the legibility of nutrition labelling. However, competent authorities may determine any additional means of presentation of nutrition information taking into account approaches and practical issues at the national level and based on the needs of their consumers.

a) **Format –** Nutrient content should be declared in a numerical, tabular format. Where there is insufficient space for a tabular format, nutrient declaration may be presented in a linear format.

b) Nutrients should be declared in a specific order developed by competent authorities and should be consistent across food products.

c) **Font –** The font type, style and a minimum font size as well as the use of upper and lower case letters should be considered by competent authorities to ensure legibility of nutrition labelling.

d) **Contrast –** A significant contrast should be maintained between the text and background so as to be that the nutrition information is clearly legible.

e) **Numerical Presentation –** The numerical presentation of nutrient content should be in accordance with the provisions.

II. SUPPLEMENTARY NUTRITION INFORMATION

Supplementary nutrition information is intended to increase the consumer's understanding of the nutritional value of their food and to assist in interpreting the nutrient declaration.

There are a number of ways of presenting such information that may be suitable for use on food labels.

The use of supplementary nutrition information on food labels should be optional and should only be

given in addition to and not in place of, the nutrient declaration, except for target populations who have a high illiteracy rate and/or comparatively little knowledge of nutrition. For these, food group symbols or other pictorial or colour presentations may be used without the nutrient declaration.

Supplementary nutrition information on labels should be accompanied by consumer education programmes to increase consumer understanding and use of the information.

III. Packaging laws and Regulations: The Indian Government has enacted laws to take care of quality standards of packaged foods. Standards have also been fixed for the particular kind of packaging required to be undertaken, depending on the product to be packed. The regulations on quality standards of packaging that govern food products in our country are given as under.

Standard Weights and Measures Act (SWMA) 1976 and the Standards of Weight and Measures (Packaged Commodities) Rule, 1977

Other Regulations related to Labelling are as follows

Prevention of Food Adulteration Act, 1954 and the Prevention of Food Adulteration Rules, 1955

Fruit Products Order, 1955

Meat Food Products Order, 1973

Agriculture Marketing (AGMARK) Rules, 1937

Bureau of Indian Standards (BIS) Act, 1986 and BIS rules, 1987

Food Safety and Standards Act, 2006 and Food Safety and Standards (Packaging and Labelling) Regulations, 2011

Food Safety and Standards Authority of India (FSSAI)

INTEXT QUESTIONS

1. Short Questions:

1. What is a label? Give the requirements of a label.
2. Give the criteria for the legibility of the labeling.
3. What are the various kinds of labels and write the benefits of labeling.
4. List the various packaging laws and regulations.

II Activity:

Choose a category of foods pick atleast five different brands of the same food category and check if the label is satisfying the criteria of label.

UNIT - 15

FOOD ADULTERATION

Introduction: Food Adulteration is defined as the practice of adulterating food or contamination of food materials by adding a substances, which lower the quality of food are called adulterants.

Adulteration means not only intentional addition or substitution or abstraction of substances which adversely affect the nature, substances and quality of foods, but also their incidental contamination during growth, harvesting, storage, processing, transportation and distribution.

Adulterant: Substances that lower the quality of food, when added to it, are called adulterants. The adulterant may be present in any form and in any quantity. Adulterants are harmful and lowers the quality of the product. Even if the adulterant is not harmful, it reduces the nutritional value of the food. Some adulterants are identified as carcinogenic or lethal when exposed for a longer period.

Food Adulterants commonly added are: Mixing of pulses with sand particles, pebbles, Mixing of milk with water, Mixing oil with chemical derivatives or cheaper oils, Packing low-quality food products with fresh and high-quality ones .

Types of Food Adulteration: There are four different types of food adulteration.

Intentional Adulteration: When substances that look similar to the constituents of food are added to increase its weight and gain more profit. Example- mixing of pebbles, stones, marbles, sand, mud, filth, chalk powder, contaminated water.

Incidental Adulteration: Incidental adulteration occurs due to negligence while handling food.eg. residues of pesticides in grains, larvae growth, presence of droppings of rodents,

Metallic Adulteration: Addition of metallic materials into food like lead or mercury

Packaging Hazard: packing materials in which the food is packed may interfere and mix with food .

Methods of Food Adulteration

1. Adding certain chemicals for faster ripening of fruits.
2. Mixing of decomposed fruits and vegetables with good ones.
3. Adding natural and chemical dyes to attract consumers.
4. Mixing of clay, pebbles, stones, sand, marble chips to grains, pulses, other crops.
5. Cheaper and inferior substances are added wholly or partially with good ones to increase the weight or nature of the product.

Effects of Food Adulteration:

Effect of food adulteration may be classified into three categories :

1. **No Effect**: Certain adulterants and harmless. Eg. Water added to adulterate milk. May not affect the consumer unless the quality of water is poor. However such adulterants consumed

over a period of time may affect the overall health.

2. **Acute toxicity Effect**: Certain adulterants like microbiological ones affect the consumer within hours or a few day's. Ex. Double vision, muscular paralysis, and death due to muscular failure. Eg. Clostridium botulism toxin causes botulism.

3. **Chronic Toxicity Effects**: These are the effects of consumption of adulterants over a long period of time. These substances, which are consumed through food, cause damage that is due to accumulation of the toxicant in the body. Metal contaminants like lead, mercury, cadmium cause systematic damage that ultimately leads to failure of the central Nervous system. and death.

   Pest and pesticide contaminants are also one of the major causes of toxicity among humans. Organic pesticides are commonly used in fields on crops , fruits and vegetables and also at home. Certain organic pesticides like malathion cause acute poisoning but other inorganic pesticide's, can cause acute toxicity.

   Several toxicants are naturally present in foods Ex. fluorine, which gives rise to fluorosis. Selenium causes acute toxicity,/chronic poisoning, Solanine in potatoes, ,gossypol in cotton seed oil, trypsin inhibitors in soybean, erucic acid, mustard oil, cyanogenic compounds in bitter almonds and apple seeds, certain beans like lima beans and roots like cassava (tapioca) are examples of the food that can casue chronic toxicity.

Prevention of Adulteration: Tips to avoid Adulteration: Avoid dark coloured, junk and other processed foods, make sure to clean and store all the grains, pulses and other food products, wash fruits and vegetables thoroughly in running water before they are used. Check if the seal is valid or not, before buying food products like milk, oil and other pouches. Always make sure to check and buy products having FSSAI-validated label, along with the license number, list of ingredients, manufactured date and its expiry date.

Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards 2006 which consolidates various acts & orders that have hitherto handled food related issues in various Ministries and Departments. FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

Highlights of the Food Safety and Standard Act, 2006

- Various central Acts like Prevention of Food Adulteration Act 1954, Fruit Products Order , 1955, Meat Food Products Order 1973.
- Vegetable Oil Products (Control) Order 1947, Edible Oils Packaging (Regulation) Order 1988, Solvent Extracted Oil, De- Oiled Meal and Edible Flour (Control) Order 1967, Milk and Milk Products Order 1992 etc will be repealed after commencement of FSS a Act 2006.

The Act also aims to establish a single reference point for all matters relating to food safety and standards, by moving from multi- level, multi- departmental control to a single line of command. To this effect, the Act establishes an independent statutory Authority the Food Safety and Standards Authority of India with head office at Delhi. Food Safety and Standards Authority of India (FSSAI) and the State Food Safety Authorities shall enforce various provisions of the Act.

Establishment of the Authority:

Ministry of Health & Family Welfare, Government of India is the Administrative Ministry for the implementation of FSSAI. The Chairperson and Chief Executive Officer of Food Safety and Standards Authority of India (FSSAI) have already been appointed by Government of India. The Chairperson is in the rank of Secretary to Government of India.

FSSAI has been mandated by the FSS Act, 2006 for performing the following functions:

- Framing of Regulations to lay down the Standards and guidelines in relation to articles of food and specifying appropriate system of enforcing various standards thus notified.
- Laying down mechanisms and guidelines for accreditation of certification bodies engaged in certification of food safety management system for food businesses.
- Laying down procedure and guidelines for accreditation of laboratories and notification of the accredited laboratories.
- To provide scientific advice and technical support to Central Government and State Governments in the matters of framing the policy and rules in areas which have a direct or indirect bearing of food safety and nutrition.
- Collect and collate data regarding food consumption, incidence and prevalence of biological risk, contaminants in food, residues of various, contaminants in foods products, identification of emerging risks and introduction of rapid alert system.
- Creating an information network across the country so that the public, consumers, Panchayats etc receive rapid, reliable and objective information about food safety and issues of concern.
- Provide training programmes for persons who are involved or intend to get involved in food businesses.
- Contribute to the development of international technical standards for food, sanitary and phyto-sanitary standards.
- Promote general awareness about food safety and food standards.

INTEXT QUESTIONS

I. Short Questions

1. Define food adulteration. List the various types of adulterations
2. What are the effects of food adulteration
3. Give the highlights of FSSA

II Activity

List the foods in your daily life and the components sed in adulterating them

MODULE IV
HEALTH

UNIT - 16

HEALTH

Definition of Health: WHO Definition: "Health is a state of complete physical, mental and social wellbeing and not merely an absence of disease or infirmity and the ability to lead a socially and economically productive life".

Physical Health: Physical health refers to the overall well-being of the body and its physiological functions. It includes aspects such as body composition, cardiovascular fitness, muscular strength, flexibility, and the absence of disease or physical ailments. Maintaining physical health involves adopting healthy habits such as regular exercise, balanced nutrition, adequate sleep, and avoiding harmful substances.

Mental Health: Mental health encompasses emotional, psychological, and cognitive well-being. It includes ones ability to manage stress, cope with challenges, maintain positive relationships. Good mental health involves having a balanced emotional state, self-esteem, and the ability to adapt to life's ups and downs.

Emotional Health: It involves understanding and managing one's emotions. Emotional health includes skills such as self-awareness, emotional regulation, empathy, and effective communication.

Social Health: Social health relates to one's ability to form and maintain positive relationships and engage in a supportive social network. It involves effective communication, respect for others, and the ability to build meaningful connections. Strong social connections and a supportive social network contribute to overall well-being and can provide a sense of belonging, acceptance and emotional support.

Intellectual Health: Intellectual health refers to the capacity to think critically, learn, and engage in ongoing intellectual pursuits. It involves being open to new ideas, seeking knowledge, and engaging in lifelong learning. Intellectual health is nurtured through activities such as reading, problem-solving, creative expression and pursuing personal interests and hobbies.

Spiritual Health: Spiritual health encompasses a sense of purpose, meaning, and connection to something greater than oneself. It involves exploring one's values, beliefs, ethics, and finding a sense of inner peace and harmony. Spiritual health can be fostered through practices such as meditation, mindfulness, religious or philosophical exploration, and engaging in activities that align with personal values.

Environmental Health: Focuses on the relationship between individuals and their physical surroundings. It involves maintaining a safe and healthy environment, minimizing exposure to environmental hazards, and promoting sustainability. Environmental health encompasses factors such as air and water quality, sanitation, access to green spaces, and sustainable practices.

Occupational Health: Focuses on impact on work and the work environment on an individual's physical, mental, and social well-being. Occupational health involves ensuring safe and healthy working conditions, occupational safety, psychosocial support in optimizing occupational health outcomes.

These dimensions of health are interconnected and influence each other. Achieving overall well-being requires attention to all these dimensions and finding a balance that supports a healthy and fulfilling life.

It is important to note that the significance of each dimension may vary for different individuals and prioritizing and addressing individual needs is crucial for maintaining good health.

Signs of good health: Given below are some signs of physical, mental and social health. They help in assessing one's state of health.

Signs of physical health: If you have good physical health you should be energetic have weight normal for age and height with bright and shining eyes, body organs functioning normally, clean skin, good appetite, sound sleep. Healthy individuals are active, responsive and happy and can work hard and perform well

Signs of mental health: Control emotions, balanced feelings, desires, ambitions and ideas, accept the realities of life and face them, confidence, ability to cope with the normal stresses, sensitivity towards needs of others, ability to give and seek help when needed,

Signs of social health: Have a positive attitude towards life, get along well with others, have a pleasant personality, healthy interpersonal relationships, able to express disagreement positively.

Factors influencing health: Human health is dependent on a number of factors that may be Internal factors: These include all the factors that are under the direct control of the individual External factors: These include the various parameters that are not on individuals will and control.

FACTORS AFFECTING HEALTH

Factors affecting health, the social and economic conditions in which people take birth, grow, live, work and age, are called the social determinants of health.

Fundamental Indicators of Good Health and How to Achieve Them

According to WHO, good health is a state of complete physical, mental and social well-being -and not merely the absence of disease or infirmity. Our body is constantly giving us clues about our health. All we have to do is look out for them and address what doesn't seem quite right. Some fundamental indicators of good health are listed below:

1. Restful and consistent sleeping patterns

Our modern lifestyle comes with great potential to hamper our sleep quality - from an inconsistent bedtime routine and too much sleep to consuming too much caffeine or alcohol, or even being stressed.

Importance of sleep for good health

Sleep is essential for our body and mind to recharge - keeping our body clock aligned with nature and our restorative cycle stable. Our sleep affects practically everything in our body - from how we feel, to our cognitive functions. Its quality is in turn, a reflection of our overall well-being.

If you're unsure whether you're getting the kind of sleep you need -

Here are some indicators of good sleep:

- You fall asleep in under 30 minutes.
- You sleep straight through the night without waking up more than once. If you wake, you fall back asleep in under 20 minutes.

- You feel rested, restored and energized upon waking up in the morning.

A few things that can help optimise your daily sleep:

- Prioritising your sleep, and following the same sleeping pattern every day (Adults need seven to nine hours of sleep per night).
- Making sure your bedroom is dark, quiet and cool (15-16° Celsius).
- Keeping the electronic devices away, at least 30 minutes before bedtime.
- Avoiding drinking alcohol within three hours of bedtime and caffeine within five hours.

2. Good energy levels

Repeatedly over-caffeinating, running on too little sleep, dehydration and deficiencies are plausible causes of having low energy levels, this should not be the norm.

So how do we figure out whether our energy levels are good?

Here are some indicators of good energy levels:

- You can do regular daily activities without any major strain, aches and pains.
- You are able to perform extracurricular activities without affecting your energy levels.

A few things that can help optimise your energy levels:

- Exercising regularly. A minimum of three days a week, for a minimum of 20 minutes a day can leave you with more energy than before.
- Replacing refined foods with whole foods, especially carbohydrates.
- Practice meditation and other stress-reduction techniques as excessive stress can cause fatigue and reduce your quality of life.

3. Healthy bowel movement

If we are passing stool too quickly or too slowly - neither is natural and could be indicative of digestive issues. If either goes on for a long period of time, it is best to actively find ways to address it.

Here are some indicators of healthy bowel movement:

While there is no defined number of how many times a person should poop, you should empty your colon often enough that you do not feel bloated or in pain.

You poop comfortably, without needing to strain. Here's a chart describing what you should see before you flush - it is called the Bristol Stool Scale.

A few things that help regularise bowel movements:

- Drinking plenty of water, around 2-4 litres per day.
- Consuming at least 30-40 grams of Fiber every day - this adds bulk to your stool, which stimulates the bowels to move.
- Eating 5-9 servings of fruits and vegetables and introducing whole grain foods to your diet.

- Consuming probiotic foods, which benefit the gut microbiome.

4. Healthy Urinary System

Our urinary system is very important because it filters our blood and eliminates toxins (healthy kidneys make "detox diets" quite redundant), extra water, salt and other waste products. A healthy urinary system keeps our body optimally functional and to put it simply, clean. So how do we keep a check on its health?

Indicators of a healthy urinary bladder include:

- Pale yellow colour urine. When you are staying properly hydrated, your urine will be a light yellow, almost similar to a clear colour.
- You are able to perform daily activities (including exercise) without any urinary discomfort or leakage.

A few tips that can help maintain urinary bladder health:

- Drinking plenty of water (at least eight glasses of a day, where 1 glass = 240 ml) can help flush bacteria out of your urinary tract.
- Keeping your genitals clean. Urinating shortly after sexual intercourse and wiping down properly has been shown to reduce the odds of developing an infection.
- Practising Kegel exercises for better bladder control.

5. Healthy and dewy skin

Our skin is a protective layer that shields us from external aggressors like pollution. In order to do its job well, it needs constant protection. It also says a lot about our health - healthy, dewy skin is a reflection of a healthy, nourished body.

So, what are the indicators of healthy skin?

- Skin that has an even tone.
- Skin that is hydrated and supple.
- The absence of any irregular sensations like stretching, burning, or itching.

A few actionable tips that can help maintain skin health:

- Using a broad-spectrum sunscreen to avoid sun damage.
- Consuming antioxidants, especially lycopene, which is found in red fruits like tomatoes, these act in a way that can be thought of as internal sunscreens.
- Consuming enough omega-3 fats, which improve its 'barrier function' (its function of sealing in moisture and keeping out irritants).

6. Healthy hair

Our hair is one of the most prominent features of our body and one of the most noticeable indicators of our state of health. Changes in the appearance, texture, or volume of our hair could be signs of

underlying health conditions. The amount of hair we shed is also symbolic of the hormonal and nutritional balance in our body.

Here are a few signs of healthy hair:

- You shed between 50 and 100 hairs a day, only.
- It doesn't feel brittle, dry, or frizzy.
- It's shiny, meaning that the cuticles are lying flat, as they should, and are creating a smooth, flat surface for light to bounce off.
- The hair on your head grows about 6 inches a year.

A few tips to help maintain hair health:

- Consuming a diet that's rich in healthy plant-based food and seafood, and relatively lower in animal-based foods.
- Avoiding tight hairstyles like ponytails, especially while sleeping.
- Avoiding excessive sun exposure, which can make hair brittle and more prone to breakage
- Avoiding overdoing chemical treatments like dying, bleaching, and heat styling.
- Avoiding crash diets, and keeping a watch for signs of nutrient deficiencies.
- Consuming adequate protein, to strengthen our hair strands.
- Avoiding harsh shampoos, especially the ones with ingredients like ammonium lauryl sulphate or sodium lauryl sulphate. Conditioning after shampoo is also important to help keep your hair soft, shiny and manageable.
- Adding omega-3 fats to your diet, which help reduce inflammation of the hair follicle, creating a healthy environment for hair growth.

7. Good oral health and neutral-smelling breath

Our oral health boils down to general lifestyle habits - things as little as brushing our teeth daily. Dental cavities, gum issues can occur due to poor oral health few lifestyle diseases are also associated with poor oral health.

So, let's look at -

The indicators of good oral health:

- You are able to consume cold and hot beverages without any discomfort or sensitivity. Our gums are pink and healthy and don't bleed while flossing or brushing.
- Your breath smells neutral.
- Your teeth have a smooth texture (it means that you have a healthy enamel which protects teeth from decay and damage).

The best ways to prevent oral health problems:

- Brushing with a fluoride toothpaste, at least twice a day.
- Flossing at least once a day (one of the most beneficial things you can do to prevent disease in your oral cavity).
- Having your teeth checked and cleaned by a dental professional every six months.
- Following a high-Fiber, low-fat, low-sugar diet that includes plenty of fruits and vegetables.
- Brushing for two minutes, twice a day may reduce your risk of heart disease.

8. Regular menstrual cycles

Regular menstrual cycles are a sign of good health and it indicates that the body is functioning normally. It also suggests that our hormones are active and balanced and that our body can support natural conception. Menstrual health is important, because it is related to our hormones on more levels than one and an imbalance in that can affect our mood, behaviour and how we feel on a daily basis.

Here are a few signs of a healthy menstrual cycle:

- A consistent cycle. An average cycle consists of 28 days, however, anything between 21 and 45 days is considered normal.
- Menstruation lasts for anywhere between two to seven days.

Here are few tips to help regulate the menstrual cycle:

- Taking vitamin D and B-vitamins if levels are low (these helps regulate the menstrual cycle and reduce PMS (As a side note, fish oil supplements also help reduce menstrual cramps).
- Exercising can regulate your cycles while also possibly reducing pain before and during your period.
- Practicing yoga for 35 to 40 minutes a day, five times a week, may help regulate hormones and menstruation cycles. Yoga can also help reduce premenstrual symptoms.

9. Healthy brain function

A healthy brain is essential for living a long and full life - for obvious reasons. It controls all our senses, constantly receives and translates messages and handles countless thoughts simultaneously. Unlike other organs, our brain is responsible for both our emotional and physical wellbeing.

Here are a few signs of good mental health:

- You are better able to concentrate, solve problems, and communicate.
- You have a reliable memory, both long- and short-term.
- You are able to and are good at making decisions.
- You are able to let go of negative experiences without having repetitive thoughts and ruminations about it.

Actionable tips for improving brain health:

- Making changes to your daily lifestyle - getting more sleep, doing things that help reduce stress like meditation, writing in a journal, or reading a book, etc.
- Indulging in music, art, dance, and other activities that help express creativity and stimulate your brain in new ways.
- Eating fruits, vegetables, tea, coffee, nuts, fish, and eggs - these contain nutrients that support brain development and help protect your brain from damage.
- Exercising regularly, which stimulates chemical changes in the brain that enhance your mood, thinking and learning.
- Sleeping on yourside may help remove brain waste that could boost memory, language, reasoning and social behaviour.
- Outdoor walking for 60 minutes twice a week boosts the hippocampus, thereby improving memory.

10. Healthy Heart

Our heart pumps blood through our body to circulate oxygen and nutrients that our organs need to work properly. It also helps get the carbon dioxide back to the lungs so we can breathe it out.

When our heart is doing its job efficiently, our body is getting the blood-borne oxygen and nutrients it needs, fuelling us with enough energy to maintain our active lifestyle.

Here are the indicators of a healthy heart:

- Breathing normally during regular physical activities is a positive sign of heart health.
- You can measure your heart rate and other health parameters using your smartphones or a fitness tracker.
- Good oral hygiene is also a sign of good heart health. Research suggests that the bacteria that cause gum disease are associated with the risk of heart disease.
- The 'stairs test' is an easy way to check your heart health: climbing four flights of stairs in less than a minute indicates good heart health.

Actionable tips for improving heart health:

- Getting at least 150 minutes of aerobic exercise every week, to strengthen your heart and lungs. Getting more than 300 minutes per week is linked to additional benefits.
- Introducing heart-healthy foods, such as fruits, vegetables, omega3 fats to your diet and limit saturated fats, trans fats, and added sugars.

11. Strong Immune System

Our immune system is what protects us against diseases or other potentially damaging foreign bodies. When functioning properly, our immune system identifies any potential threats (including viruses, bacteria and parasites) and eliminates them from our body. This is our inner system that heals wounds, prevents illnesses and protects us from infections and foreign bodies.

Here are the signs of a good immune system:

- Your wounds heal in time.
- You can do your daily activities without feeling tired. You also feel well-rested after sleeping.
- You have a healthy gut (mild symptoms of imbalance in the gut microbiome could be gas, bloating, and discomfort).
- You don't have auto-immune diseases such as arthritis, dermatitis, type 1 diabetes, or inflammatory bowel disease.

Things to do to help boost the immune system:

- Managing your stress levels by writing, meditating, dancing, exercising, or talking to a loved one can go a long way. Prolonged chronic stress can impair the body's ability to fight infection, reduce the effectiveness of vaccines, suppress the immune response, and much more.
- Exercising leads to a ten-fold increase in the immune cells that help your body fight infection. Healthy adults should do at least 150 minutes of moderate aerobic activity, like walking or dancing, weekly. Alternatively, at least 75 minutes of vigorous activity, like swimming, weekly.
- Getting seven to nine hours of sleep also helps the immune system function properly.
- Consider setting up a sleep-promoting routine with calming activities such as meditation, lavender inhalations and reduced gadget exposure before bedtime.
- Eating a balanced diet and making sure there are no key deficiencies, given that nutrients such as protein, omega-3 fats, vitamins (A, B_6, B_{12}, folate, C, D, and E), and minerals (zinc, copper, selenium, iron) play key roles in supporting the human immune system.

12. Healthy Eyes

We don't really need to address how important eyes are and what a gift vision is to humans. Maintaining eye health is important in order to maintain clean and clear vision and of course avoid any forms of infection or damage to eyes in the long run.

Here are some signs that you have healthy eyes:

- Your eyes are not too watery or dry. They feel normal and do not experience any unusual discomfort.
- You can see clearly without any blurry spots.
- Your eyes are not red (these could be caused by allergies, eye fatigue or common eye infections).
- There are no scratches on your cornea.

Things you can do to improve your eye health and to protect your eyes:

- Wearing sunglasses to shield your eyes from UV rays.
- Giving your eyes a rest after every 20 mins of looking at a screen.
- Being extra careful of eye infections, maintain proper hygiene, especially if you wear contacts.

- Doing eye exercises three days a week.

13. Healthy Bones

Our bones support our body structure and protect vital organs from getting injured. They store crucial elements like calcium and phosphorus and our WBCs, RBCs and blood platelets are formed in the bones. Strong, properly functioning bones are a very prominent indicator of good health.

Here are some signs of healthy bones:

- You can hold onto things without any trouble or discomfort.
- You have no trouble walking long distances and running or jumping does not cause pain in your joint.
- You can climb a flight of stairs without experiencing pain or discomfort.

Things you can do to improve bone health:

- Include physical activity in your daily routine.
- Eat calcium rich foods.
- Increase your vitamin D intake as it is required for the absorption of calcium.
- Consume foods rich in vitamin K_2 and magnesium as the former helps increase bone- mineral density and the latter helps with vitamin D absorption.
- Collagen is a major constituent of bone mass, so ensure you eat foods rich in collagen or add collagen peptide supplements to your diet in order to maintain good bone structure.

Our body is a complex and very intelligent system with its unique ways of telling us things. We can solve most of our problems by just listening to it.

Lifestyle is a way used by people, groups and nations and is formed in specific geographical, economic, political, cultural and religious text. Lifestyle is referred to the characteristics of inhabitants of a region in special time and place. It includes day to day behaviours and functions of individuals in job, activities, fun and diet. Lifestyle is the way of living of an individual. It includes their day-to-day behaviour, their functions at job, activities, personality, preferences and diet.

As per Collins Dictionary "Lifestyle of a particular person or group of people is the living conditions, behaviour and habits that are typical of them or are chosen by them."

According to people's health, there can be two types of lifestyles: Healthy lifestyle and Unhealthy lifestyle.

Good nutrition, daily exercise and adequate sleep are the 3 basic foundations of a healthy lifestyle, which keeps a person energetic, fit and at a reduced risk of developing disease. Not only this, lifestyle has a significant influence on physical, mental and social well-being of humans. Still some people do not pay attention to their lifestyles.

Lots of people nowadays have an unhealthy lifestyle, because of which they encounter illness, disability and sometimes even death.

There are several problems such as metabolic diseases, being overweight, joint and skeletal problems, cardio-vascular diseases, hypertension, violence, that is attributable to an unhealthy lifestyle.

Consanguinity in some communities is a dominant form of life style that it leads to genetic disorders. Reformation of this unhealthy life style is a preventing factor for decreasing the rate of genetic diseases.

Variables of lifestyle that influence on health can be categorized as follows :

1. **Diet and Body Mass Index (BMI):** Diet is the greatest factor in lifestyle and has a direct and positive relation with health. Poor diet and its consequences like obesity is the common healthy problem in urban societies. Unhealthy lifestyle can be measured by BMI. Urban lifestyle leads to the nutrition problems like using fast foods and poor foods, increasing problems like cardiovascular.

   There is truth to the old saying that 'you are what you eat'. Each time you eat, you are influencing your health for good or ill. And while there's no harm in enjoying treats in moderation, it is very easy for unhealthy choices to creep into your regular diet.

   A healthy diet is high in fresh fruits and vegetables, lean meats and whole grains. Watch your portion sizes too. The second and third helpings will always involve more calories than you need.

   Try keeping a food diary for a few days to notice what you eat and why you eat. If you notice that you are eating because you are stressed or bored, then try to distract yourself with something else until the urge passes.

   To improve your eating habits, try the reflect, replace, reinforce approach:

   - Reflect on your good and bad eating habits, paying particular attention to the triggers for unhealthy habits.
   - Replace your unhealthy habits with better ones, for example, eating more mindfully, planning ahead or eating only when hungry.
   - Reinforce your new habits one day at a time and treat any missteps as a learning experience.

   Water is probably the most vital nutrient our body needs. It's essential to our body functioning.

   Women should drink about eight glasses of water a day while men need ten.

   To help you drink the right amount, try:

   - Keeping a bottle of water on your desk and sipping throughout the day.
   - Adding flavour with a slice of lemon or strawberries.
   - Drinking water whenever you eat.
   - Keeping a bottle in the car so you can sip while driving.

2. **Exercise:** For treating general health problems, the exercise is included in life style. The continuous exercise along with a healthy diet increases the health. Some studies stress on the relation of active life style with happiness.

   By the end of a week, you should have clocked up 2.5-5 hours of moderate-intensity activity such as a brisk walk, golf game, swimming or mowing the lawn.

   Alternatively, you could do 1.5-2.5 hours of vigorous activity like jogging, aerobics, fast cycling, soccer or netball.

   Start with small changes and build up. If you don't think you're doing enough, then try building more activity into each day by:

   - Walking or cycling for short journeys
   - Parking further away
   - Getting off the bus a few stops earlier
   - Taking the stairs instead of the lift
   - Meeting friends for a walk rather than a meal or a movie
   - Doing more incidental exercise at home by cleaning or gardening.
   - A step counter can be a great motivator, encouraging you to reach 10,000 steps a day

3. Sleep: One of the bases of healthy life is the sleep. Sleep cannot be apart from life. Sleep disorders have several social, psychological, economical and healthy consequences. Lifestyle may affect on sleep and sleep has a clear influence on mental and physical health.

4. Sexual behaviour: Normal sex relation is necessary in healthy life. Dysfunction of sex relation is the problem of most of societies and it has a significant effect on mental and physical health. It can be said that dysfunctional sex relation may result in various family problems or sex related illnesses like; STD & Infections not more prevalent than other common STDS.

5. Substance abuse: Addiction is considered as an unhealthy life style. Smoking and using other substance may result in various problems; cardiovascular disease, asthma, cancer, brain injury. According to the resent studies in Iran, 43% of females and 64% of males experience the use of hubble-bubble. A longitudinal study shows that 30% of people between 18–65 years old smoke cigarette permanently.

6. Medication abuse: It is a common form of using medication in Iran and it is considered as an unhealthy life style. Unhealthy behaviours in using medication are as followed: self- treatment, sharing medication, using medications without prescription, prescribing too many drugs, prescribing the large number of each drug, unnecessary drugs, bad handwriting in prescription, disregard to the contradictory drugs, disregard to harmful effects of drugs, not explaining the effects of drugs.

7. Application of modern technologies: Advanced technology facilitates the life of human beings. Misuse of technology may result in unpleasant consequences. For example, using of computer and other devices up to midnight, may affect on the pattern of sleep and it may disturb sleep. Addiction to use mobile phone is related to depression symptoms.

8. Recreation: Leisure pass time is a sub factor of life style. Neglecting leisure can bring negative consequences. With disorganized planning and unhealthy leisure, people endanger their health.

9. Study: Study is the exercise of soul. Placing study as a factor in lifestyle may lead to more physical and mental health. For example, prevalence of dementia, such as Alzheimers disease is lower in educated people. Study could slow process of dementia.

How healthy is your lifestyle right now? Which of these habits are you guilty of and what can you do to live better?

8. Neglecting relationships: Your social life can actually improve your health. Many studies show that people who arestrongly connected to the family, friends and wider community are happier, have fewer healthproblems, and live longer.

10. Reduce stress: How much stress are you under? Is it the short-term type like rushing to get to work on time? Oris long-term stress from a relentless workload or caring for someone with a serious illness?

Long-term stress has many effects on your health and wellbeing, influencing your immune system, digestion, heart health and mood.

Sometimes, it is wise to consider reducing stress by finding a different job or moving closer to family support. Sometimes you cannot change the situation but you can learn ways to reduce the impact of stress on your body.

INTEXT QUESTIONS

I. Short Questions

1. What are the factors affecting the health?
2. Give the signs of good health.
3. How is personal hygiene achieved by the personnel.

II. Activity

Section-I

Features of personal health and hygiene. Mention No or Yes

1. Each morning when you get up do you have enough energy to carry out your routine/regular activities of the day.
2. Do you attempt to play, work and study regularly?
3. Do you have good appetite?
4. Do you have regular toilet habit?
5. Do you bathe regularly?
6. Do you wear clean clothes?

7. Do you have healthy, good textured hair and clean skin without rashes?
8. Do you have fresh breath?
9. Do you get sound sleep?
10. Do you spend enough time with your family?

Section-II

Features of mental health. Mention Yes or No.

1. Whenever there is a disagreement with your friends/ elders, do you always accept their view to keep them happy?
2. Do you often go to bed late but force yourself to get up early in the morning to attend to your jobs duties well?
3. When facing a difficult situation/problem or challenge that you are unable to meet do you feel dejected and not seek help from others?
4. Do you often choose fast food like noodles/pizza/burger over home cooked food?

UNIT - 17

HYGIENE

"**Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases."** WHO.

Hygiene comprises of personal hygiene and hygiene of surroundings. (Sanitation)

Personal Hygiene: Personal hygiene is a practice performed by an individual to care one's body health and well-being through cleanliness. It is widely practiced at the individual level at home. It involves maintaining the cleanliness of our body and clothes.

Body hygiene (skin care): The body has nearly two million sweat glands. Moistened and dried sweat and dead skin cells all together make dirt that sticks on to the skin and the surface of underclothes. The action of bacteria decomposes the sweat, thereby generating bad odor and irritating the skin. This is especially observed in the groin, underarms and feet, and in clothing that has absorbed sweat. Skin infections such as scabies, pimples and ringworm are results of poor body hygiene.

Taking bath daily with soap is important to ensure body stays clean, genitals and the anal region need to be cleaned well because of the natural secretions of these areas. Dry the body with a clean towel after thorough rinsing. Change into clean underwear after a bath. Avoid sharing soaps and towels because of the danger of cross-infection.

Oral hygiene: Mouth is most prone to collecting harmful bacteria and generating infections. Mouth mechanically breaks food into pieces. This process leaves food particles stick to the surface of gums and teeth. Mouth cavity is full of bacteria and is a good environment for bacterial growth. The decaying process that takes place on the surface of the teeth eventually this results in tooth decay.

Face hygiene: Face hygiene includes all parts of the face. The most important area is eyes. Eye discharges protective fluids that could dry and accumulate around the eye, eye discharge can attract and flies are carriers of germs that cause conjunctivitis. A person should wash their face every morning in order to remove all dirt that they have come in contact with during the course of the day. This will keep your face clean all day. Children are advised to wash their face frequently. Never share your face towel with others.

Fingernail and toenail hygiene (nail care): Long fingernails tend to accumulate dirt on the underside. The dirt could be of defecation or touching infected and contaminated surfaces. Keeping nails trimmed weekly is important in maintaining good health. Clip nails short along their shape but do not cut them so close that it damages the skin. Razor blades and fingernail cutters or scissors are used to cut nails. Nail cutters should not be shared with others.

Care of Ear: Ear wax accumulates in the ear canal that leads from the outer ear to the ear drum. As the secretion comes out of the ear it collects dust particles from the air. Daily washing with soap and water is enough to keep the outer ear clean. Do not reach farther than you can with your little finger into your ear. Putting in hairpins, safety pins or blunt-edged things for cleaning purposes might harm the ear. If you feel wax has accumulated and is plugging your ears and interfering with hearing, consult your doctor.

Hair hygiene (hair care): Hair follicles from which hair grows produce oil from the sebaceous glands that keeps the hair smooth. The scalp (the skin covering the head) also has numerous sweat glands and is a surface for the accumulation of dead skin cells. The oil, sweat and dead cells all add together and can make the hair greasy and look dirty unless you wash it regularly. Poor hair hygiene could cause dandruff and skin infections such as Tinea capitis. Dandruff is dead skin on the scalp that comes off in tiny flakes when sebaceous glands produce too much oil and accumulates on the scalp. Hair on head is a good harbor for lice (Pediculus humanus capitis) and nits (eggs of head lice). The head louse is a tiny insect that lives by sucking blood. Children are especially prone to lice infestation. Lice spread from one head to another when there is close contact in school environments. They make the scalp itchy and are a cause of annoyance, irritation and embarrassment. Shaving of the head hair is necessary in cases of heavy lice infestation. Sharing of blades with others, however, should be discouraged. Hair cleaning is important to ensure it stays clean, healthy and strong. The recommended procedures for cleaning the hair are.

Use clean water to wash hair regularly (at least twice weekly) with body soap or shampoo, whichever is available. Massage your scalp well. This will remove dead skin cells, excess oil and dirt, rinse well with clean water, conditioner is helpful if you have longer hair as it makes the hair smoother and easier to comb, but hair doesn't need to have conditioner, use a wide toothed comb for wet hair as it is easier to pull through, dry the hair and the head with a clean towel. Never share a towel with someone else. Comb the hair to look beautiful for the day.

Foot hygiene (foot care): Feet sweat as we walk day and night and the sweat accumulates on all foot surfaces and between the toes. The sweat may stain the shoes and can produce bad odor and bacteria and fungal growth between the toes. Feet should be washed daily. Toe nails do not have much role in the transmission of diseases. However, they can accumulate dirt and this can increase the potential for bacterial and fungal breeding.

Armpit and bottom care: After puberty, sweat gives specific and unpleasant odor. The armpits and the bottom should be washed daily. The anus and buttocks may be cleansed with water or toilet paper. Hands must be washed with soap regularly after use of rags, leaves, stones, corn cobs, or sticks must be discouraged as these materials can damage the skin.

Clothing: There are two layers of clothing - internal layer (underclothes) these are next to skin and collect sweat and dead skin cells, which can stain the cloth, bacteria can grow on this dirt and produce a bad smell . Underwear must be washed more frequently than the outer layer of clothing. Changing used clothes for clean clothes every day is recommended. Washing dirty clothes requires adequate clean water, detergents (solid or powdered soap) and washing facilities. If possible, the washed clothes should be ironed to help the destruction of body lice and nits. Boiling water or insecticides can be used to destroy clothes infestation, frequency of changing is advised. The frequency mainly depends on the intensity of dirt on the clothes, climate and type of activity.

Menstrual hygiene (Personal hygiene for women): Washing external genitals, with clean water must be a daily practice. The onset of menstruation is one of the most important changes occurring among the girls during the adolescent years. The first menstruation (menarche) occurs between 11 and 15 years. Although menstruation is a natural process, it is linked with several misconceptions and practices, which sometimes result into adverse health outcomes, leading to reproductive tract infections (RTI).

To manage menstruation hygienically, it is essential that women and girls have access to water and sanitation. They need to change sanitary cloths or pads, clean water and soap for washing their hands. There is also a need for both men and women to have a greater awareness of good menstrual hygiene practices.

Sleep: Must have good sleep habits. Everyone sleep is different. Stop pre-sleep electronic use 30 minutes before bed.

- Use bed only for sleep and sickness.
- Remove naps. If you really feel the need to nap, do it before 3pm and keep it under an hour. Keep fixed bedtime and wakeup time.
- Avoid caffeine and alcohol (4-6 hours before bed).
- Do relaxing activities pre-sleep such as stretching, calm music, slow breathing, shower. Do boring activities pre-sleep such as listen to a radio show or read an uninteresting document, select comfortable pillows & mattresses, remove distractions, use a sound machine, get darker curtains, wear socks, exercise at the right time.
- Do exercise during the day get up and try again.

Hand Washing: Cleanliness of hands is important in all daily activities as hands frequently get dirty, microorganisms attach to hands along with dirt. Hygienic hand washing leads to mechanical removal of microorganisms from contaminated hand surfaces.

Hand Washing Technique: First wet your hands with clean water and lather with soap, next rub your hands together vigorously and scrub all surfaces up to your wrists, clean under your fingernails, scrubbing with soap removes germs, dry hands in the air to avoid recontamination on a dirty towel – do not touch anything until your hands are dry, clean sand with water can be used for hand washing to help to rub off dirt. If you don't have soap, you can use alternatives. These serve the same purpose as the soap, to help 'scrub' what is stuck on your hands, so the running water can brush it off. To get clean hands, you must pour the water over your hands (no dipping in a bowl). The soap or ash 'lifts' the dirt and the water then washes off the visible dirt and the invisible germs.

As well as routine personal hygiene that applies to everyone, your daily work will include many situations when you may ask yourself when you need to wash your hands.

Situations in everyday activity which require washing include:

After using the toilet (or disposing of human or animal faeces), after changing a baby's diaper (nappy) and disposing of faeces. Immediately after touching raw food when preparing meals (eg. chicken or other meat). before preparing and handling cooked/ready-to-eat food. before eating food or feeding children, after contact with contaminated surfaces (eg. rubbish bins, cleaning cloths, food contaminated surfaces), after handling peats and domestic animals after wiping or blowing the nose or sneezing into the hands (respiratory hygiene), after handling soiled tissues (your own or others, eg. children).

Critical situations in healthcare include: washing hands before and after contact with an infected wound, after contact with blood or body fluids (eg. vomit), before and after dressing wounds, before giving care to an 'at risk' person (eg. attending delivery, attending a baby), after giving care to an infected person.

A toiletry bag or kit is a portable container usually a pouch with a drawstring or zippered closure that holds body hygiene and toiletry supplies such as toothbrush and toothpaste, dental floss, Small bar soap, disposable shower cap, moisturizer, shampoo and conditioner, toilet paper, facial tissue, face towels, disposable shoe polishing cloth ,toothpaste, toothbrush.

Sanitation includes prevention of human contact with wastes, promoting health through prevention of human contact with food, water, housing and control of vectors (living organisms that transmit diseases). It focuses on management of waste produced by human activities.

Basic sanitation is defined as having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage collection, industrial/hazardous waste management and wastewater treatment and disposal.Management of human feces at household level, access to a toilet or latrine.

Methods of Adequate Sanitation:

Water Supply Levels: If the water supply is up to 50 liters per capita daily pour flush and vault toilets are better options. Similarly, if there are no constraints on water supply, cistern flush toilets with conventional sewerage or septic tank options are more suitable.

Hygiene and Sanitation: Various factors including costs, reuse potential, environmental factors and. institutional constraints must be given due consideration prior to finalizing the sanitation option for a particular locality.

Open Defecation: Is undesirable means and must be avoided in the vicinity of human habitation.

Sewerage System: Mixture of excreta and waste water from households are transported through a network of underground pipes. The system provides highest level of user convenience for all type of waste water disposal, involving no health risks and a very minimal maintenance. The treated water can be utilized for irrigation purposes.

Water used for drinking, cooking, bathing and washing utensils should be from a clean source such as taps, hand pumps and covered wells setup by corporations/panchayats.

Community Health is the practice of preventing disease and promoting health of a population through the organized efforts of society, public and private organizations, communities and individuals. There are various activities and programs undertaken by the government and local organizations to maintain health of the people and keep them free from disease.

Some of these activities and programs are listed below:

- Maintain cleanliness of the villages, towns, cities and localities through proper garbage disposal.

- Ensure that prescribed standards in food stores, meat and milk outlets are strictly followed.
- Organize health promotion, disease prevention and Immunization programs .for infants and children, Eg. National Pulse Polio Program .
- Awareness programs have been undertaken against the spread of diseases of national concerns like malaria, AIDS, polio, leprosy, tuberculosis and hepatitis B.
- Organize mid-day meals in schools to provide adequate nourishment to growing children.
- Set up hospitals and dispensaries to provide medical facilities to the general public either free of cost or at highly subsidized rates.

Environment cleanliness: To keep the environment clean keep our house clean, keep our neighborhood clean an effective drainage system is essential as stagnated water allows breeding of mosquitoes.

Occupational health or industrial hygiene: Occupational hygiene is the discipline of protecting worker health by controlling workplace hazards that can cause harm. It also helps in maintaining worker well-being and safeguarding the community at large.

Occupational Hygiene is the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large (IOHA).

Occupational Hygiene has also been defined as the practice of identifying of hazardous agents; chemical, physical and biological in the workplace, that could cause disease or discomfort, evaluating the extent of the risk due to exposure to hazardous agents and the control of those risks to prevent ill-health in the long or short term.

Principles of occupational hygiene: Four basic principles of industrial hygiene are –

1) Anticipation, 2) Recognition, 3) Evaluation 4) Control of workplace health hazards

Benefits of Occupational Hygiene: Improved worker health and increased life expectancy.

Classifications of occupational health, safety and hygiene hazards are classified as Physical Hazards, Mechanical Hazards, Chemical Hazards, Biological Hazards, Ergonomic Hazards, Psychosocial Hazards

For chemicals, the hazard can be understood by the dose response profile most often based on toxicological studies or models.

Occupational hygienists work closely with toxicologists for understanding chemical hazards, physicists for physical hazards and physicians and microbiologists for biological hazards. Environmental and occupational hygienists are considered experts in exposure science and exposure risk management. Depending on an individual's type of job, a hygienist will apply their exposure science expertise for the protection of workers, consumers and/or communities.

The first set of occupational hygiene standards were first proposed for organic solvents and irritant gases. The Occupational Safety, Health and Working Conditions Code 2020 (OSH Code), Industrial

Relations Code 2020 and Social Security Code 2020 and Contract Labour (Regulation and Abolition) Act 1970, the Factories Act 1948 under Occupational health or industrial hygiene.

Excessive hygiene: Too much cleanliness may be cause for developing allergies, asthma, inflammatory bowel diseases, and other autoimmune disorders. Due to lack of exposure to bacteria, viruses, and allergens prevents the normal development of the immune system, ultimately increasing the chance of disorders within this system called as the hygiene hypothesis.

"The hygiene hypothesis suggests that early life exposure to microbes helps in infants developing immune system. hygiene hypothesis is still a hypothesis.

Methods of Waste Disposal

Garbage accumulation has never been much of a concern in the past, but due to globalization and industrialization, there is a need for a more efficient waste disposal method.

Methods that are used today are landfill waste that cannot be reused or recycled are separated out and spread as a thin layer in low-lying areas across a city. A layer of soil is added after each layer of garbage.

Incineration is the process of controlled combustion of garbage to reduce it to incombustible matter such as ash and waste gas. This process reduces the volume of waste by 90 per cent and is considered as one of the most hygienic methods of waste disposal.

Waste Compaction: Cans and plastic bottles are compacted into blocks and sent for recycling. This process prevents the oxidation of metals and reduces airspace need, thus making transportation and positioning easy.

Biogas Generation: Bio degradable waste - food items, animal waste or organic industrial waste from food packaging industries are sent to bio-degradation plants. In bio-degradation plants, they are converted to biogas by degradation with the help of bacteria, fungi, or other microbes. Here, the organic matter serves as food for the micro-organisms. The degradation can happen aerobically (with oxygen) or anaerobically (without oxygen). Biogas is generated as a result of this process, which is used as fuel, and the residue is used as manure.

Composting: All organic materials decompose with time. Food scraps, yard waste, etc., make up for one of the major organic wastes day. The process of composting starts with these organic wastes being buried under layers of soil and then, are left to decay under the action of microorganisms such as bacteria and fungi. This results in the formation of nutrient-rich manure. In agriculture, it is the best alternative to chemical fertilizers.

Vermi Composting: Is the process of using worms for the degradation of organic matter into nutrient-rich manure. Worms consume and digest the organic matter. The by-products of digestion which are excreted out by the worms make the soil nutrient-rich, thus enhancing the growth of bacteria and fungi. It is also far more effective than traditional composting.

Importance of Sanitation: Everyone should practice good hygiene since it prolongs life and helps maintain health. Children, however, should pay particular attention to it.

Sanitation facilitates: A healthier workplace, infestation by pests is avoided, shelf life can be extended, existing microorganisms are eliminated, injury risk is reduced by sanitation.

Types of Sanitation: Container-based Sanitation, toilets collect human waste in detachable, lockable containers that are then taken to treatment facilities. A method that transports waste via a dry, drainless toilet is known as dry disinfection.

Alternatives to Improve Water Sanitation: For individuals without sewage infrastructure, it is advised to install affordable on-site wastewater treatment systems to enhance sanitation and reduce the risk of waterborne illnesses.

Human waste on-site sewage disposal systems include the following:

Septic Tanks: An underground concrete tank that is huge and covered and includes an entrance pipe at one end and an outlet pipe at the other makes up a typical septic tank. The septic tank's inflow pipe is joined to the toilet seat. Through the inflow pipe, the toilet seat is connected to the septic tank. Septic tanks are appropriate for locations without a sewage system. .

Chemical Toilets: Directly beneath the toilet seat, a chemical toilet employs a container that has been chemically treated. Chemicals help to partially disinfect and lessen the smell of human feces. After a given amount of time, the storage capacity of chemical toilets for human waste lines is limited. Chemical restrooms only exist in transportable restrooms. Chemical restrooms are used on building sites and at sizable outdoor events like weddings and music festivals since they are portable.

INTEXT QUESTIONS

I. Short Questions

1. What are the methods of waste disposal.
2. Write the importance and types of Sanitation.
3. Write the four basic principles of occupational hygiene.

II. Essay Question

What are the aspects of personal Hygiene and comment on the methods of adequate sanitation?

III. Activity

1. Identify the waste at your home and write the method of disposal of each item.

UNIT - 18

PUBLIC HEALTH

Definition of Public Health: Public health is defined as the science and art of preventing diseases, prolonging life, promoting health and efficiencies through organized community effort. It is concerned with the health of the whole population and the prevention of disease from which it suffers. It is also one of the efforts organized to protect, promote and restore peoples' health. It is the combination of sciences, skills and beliefs that is directed to the maintenance and improvement of health of all people through collective social actions.

Public Health promotion comprises of

1. Addressing the population as a whole in health-related issues, in everyday life as well as people at risk for specific diseases.
2. Undertaking activities to seek out and remedy risk factors in the community that adversely affect health.
3. Promoting factors that contribute to a better condition of health of the population.
4. Initiating actions against health hazards, communication, education, legislation, fiscal measures, organizational change, community development and spontaneous local activities.
5. Involving public participation in defining problems, deciding action.
6. Advocating relevant environmental, health, and social policy.
7. Encouraging health professionals' participation in health education and health policy.

Prevention: Prevention refers to the goals of medicine that are to promote, to preserve, and to restore health when it is impaired, and to minimize suffering and distress.

Three levels of Prevention:

1. Primary Prevention: Refers to those activities that are undertaken to prevent the disease and injury from occurring. It works with both the individual and the community. It may be directed at the host, to increase resistance to the agent (such as immunization or cessation of smoking), or may be directed at environmental activities to reduce conditions favorable to the vector for a biological agent, such as mosquito vectors of malaria.

2. Secondary Prevention is the early diagnosis and management to prevent complications from a disease. It includes steps to isolate cases and treat or immunize contacts to prevent further epidemic outbreaks.

3. Tertiary Prevention involves activities directed at the host also at the environment in order to promote rehabilitation, restoration and maintenance. Providing a wheelchair, special toilet facilities, doors, ramps, and transportation services for paraplegics are often the most vital factors for rehabilitation.

Rehabilitation is the process of restoring a person's social identity by repossession of his/her normal roles and functions in society. It involves the restoration and maintenance of a patient's physical, psychological, social, emotional, and vocational abilities. Interventions are directed towards the

consequences of disease and injury.

The provision of high-quality rehabilitation services in a community should include the following:

1. Conducting a full assessment of people with disabilities and suitable support systems.
2. Establishing a clear care plan.
3. Providing measures and services to deliver the care plan.

The new public health is compressive in scope. It relates to or encompasses all community and individual activities directed towards reducing factors that contribute to the burden of disease and foster those that relate directly to improved health. Its programs range from Immunization, health promotion, and childcare to food labeling and food fortification to the assurance of well-managed, accessible health care service. The planning, management, and monitoring functions of a health system are indispensable in a world of limited resources and high expectations. This requires a well-developed health information system to provide the feedback and control data needed for good management. It includes responsibilities and coordination at all levels of government and by nongovernmental organizations (NGO'S) and participation of a well-informed media and strong professional and consumer organization. No less important are clear designations of responsibilities of the individual for his/her own health, and of the provider of care for human, high quality professional care.

MAJOR DISCIPLINES IN PUBLIC HEALTH

Nutrition is the science of food, the nutrients and other substances therein, their action, interaction and balance in relation to health and disease.

Reproductive health is a state of complete physical, mental and social being not only absence of disease or infirmity, in all matters relating to reproductive system and to its functions and process.

Environmental Health first is to identify specific biologic, chemical, social and physical factors that represent hazards to health or well-being and to modify the environment in a manner that protects people from harmful exposures. The principal components of environmental health are water sanitation, waste disposal, etc.

Health Education combination of learning experiences designed to facilitate voluntary actions conducive to health.

Epidemiology is the study of frequency, distribution, and determinants of diseases and other related states or Introduction to Public Health in specified populations. The application of this study to the promotion of health and to the prevention and control of health problems.

Health Economics is concerned with the alternative uses of resources in the health services sector and with the efficient utilization of economic resources such as manpower, material and financial resources.

Biostatistics is the application of statistics to biological problems, application of statistics especially to medical problems.

Health Service Management is getting people to work harmoniously together and to make efficient use of resources in order to achieve objectives.

Ecology is the study of relationship among living organisms and their environment. It is the science, which deals with the inter-relationships between the various organisms living in an area and their relationship with the physical environment. Human ecology means the study of human groups as influenced by environmental factors, including social and behavioral factors.

Research is a conscious action to acquire deeper knowledge or new facts about scientific or technical subjects. It is a systematic investigation towards increasing knowledge. It aims at the discovery and interpretation of facts, revision of accepted theories, or laws in the light of new facts or practical application of such new theories or laws.

Demography is the study of population, especially with reference to size and density, fertility, mortality, growth, age distribution, migration and the interaction of all those with social and economic conditions.

Core activities in Public Health: Preventing epidemics, Protecting the environment, work place, food and water, promoting healthy behavior, monitoring the health status of the population. Mobilizing community action, responding to disasters, assuring the quality, accessibility and accountability of medical care, reaching to develop new insights and innovative solutions and leading the development of sound health policy and planning community health, clinical medicine and public health.

Community health refers to the health status of a defined group of people and the actions and conditions both private and public (governmental) to promote, protect and preserve their health. Whereas public health refers to the health status of a defined group of people and the governmental actions and conditions to promote, protect and preserve their health.

Clinical Medicine is concerned with diagnosing and treating diseases in individual patients, objective of both public health and clinical medicine is better health for individual and for society. Ready access to high quality health care services is a right of the population and a requirement of good public health. This requires the availability of high-quality providers of clinical and preventive care, both direct and indirect approaches.

- Direct measures in public health include immunization of children, modern birth control, hypertension and diabetes case findings.
- Indirect methods used in public health protect the individual by community –wise means, such as raising standards of environmental safety, assurance of a safe water supply, sewage disposal, and improved nutrition. In public health practice, both the direct and indirect approaches are relevant.

Ethical Issues and Challenges in Public Health : Public health is usually viewed as a broad social movement, a way of asserting social justice, value and priority to human life. The following are challenges and ethical concerns in public health.

Political Conservatism and Public Health: Politics conserves the broad vision of public health and prefers it to limit to focusing on controlling communicable diseases and a safety net providing medical care to the indigent.

Collective Scope and Individualism: Individualistic societies resist the notion of public health's concern for the collective

Economic Impacts: Public health regulations affect the industries (E.g., tobacco), those paying for the public health benefits may not necessarily be the beneficiaries (E.g., Regulatory actions for worker safety raising costs to consumers), people may not be willing to pay costs for benefits that would accrue in the long future (E.g., measures to limit global warming) and it is easier to calculate current costs incurred for public health than the benefits that would come later.

Paternalism Versus Libertarianism: Restrictions on individual behavior for protecting their own health (E.g., enforcing seat belts). libertarianism claims that "the only purpose for which power can be rightfully exercised over any member of a civilized community, against her / his will is if her/his act harms others (E.g., regulate drunk behavior no drinking)

Public Health Measures and Religion/moral: Some public health measures are not acceptable on religious and moral grounds, (E.g. sex education and distribution of contraceptives and/or condoms to adolescences).

Values and Responsibilities: Health authorities deciding on values and choices of those they serve (e.g., whether someone should not take the responsibility on behavior causing ill health such as smokers, alcoholics, promiscuous people), decision on whether to emphasize HIV/AIDS prevention versus ARV therapy in poor countries, the extent of providing access to benefits to research subjects

Dilemmas in Cost Benefit Analysis: The difficulty of valuing life, and values to be assigned for the rich versus the poor.

I. Communicable Diseases

Communicable diseases spread from one person to another by the entry of pathogens (disease causing organisms). Pathogens enter our body through various means, and then multiply there. They can be transferred from one person to another by direct or indirect contact.

Tabel 25 Method of Transmission

Direct	Indirect
• Close contact with the diseased person	• Fomite like bedding, used utensil, towels etc.
• Droplet infection	• Vector like mosquitoes
• Exposure to contaminated blood	• Carrier like house flies and cockroaches
	Through inhalation of in infected droplets present in air
• Infected mother to the fetus	

Droplet infection

The tiny droplets of mucous that are thrown out when a person is coughing, sneezing or spitting may contain the pathogen if the person is infected. By inhaling the air containing the infected droplets, a healthy person may get the infection. Diseases like cold, influenza, tuberculosis (TB), whooping cough and measles spread through droplet infection.

Fomite is any non-living object or substance capable of carrying disease causing organisms and hence, transferring them from one individual to another. Fomite could be anything, for example, clothing, utensils bedding items and others.

Under no circumstances should the individual suffering from infection be blamed or stigmatized. It is important to remember that certain infections, for example, the Human Immunodeficiency Virus (HIV) do not spread by shaking hands, hugging and/or sharing food. Hence, there should be no hesitation or fear in sharing these activities with HIV-infected individuals.

Carriers like flies/ other insects which transfer germs from one place to another and thereby contaminate food or drink.

Vectors: Organisms that harbor germs within their body but remain unaffected by them (for example, female Anopheles mosquito). The germs multiply/ develop in the vectors' body and get transmitted to humans as vectors come in contact with them.

Chicken Pox: Especially seen in winter & spring. Resperatory symptoms, not feeling well, low-grade fever followed by rash starting on face & trunk spreading to rest of body. Fluid filled vesicles rupture & scab over within 1 week. Incubation period : 10- 21 days, communicated through inhalation of airborne droplets & direct contact of weeping lesions & contaminated linen. Prevention Mask patient. Provider should avoid contact if they've never had chickenpox. Vaccination now available (1995) and part of childhood immunizations. Put isolated until all lesions crusted over and dry.

Common Cold: More than 200 strains of viruses cause common cold. Milld often without fever and without muscle aching. Incubation period is 12 hours to 5 days. Communicated by direct contact, droplet and through contaminated hands and linens. Prevention is through hand washing .

Conjunctivitis (Pink Eye): The clinical syndrome begins with tearing, irritation & redness of eye(s), followed by edema of lids, photophobia (light sensitivity) and pus drainage. Course lasts from 2 days up to 2-3 weeks. Incubation period is 24 -72 hours. Communicated through contact with discharge or upper or though the upper respiratory tract of infected persons (fingers, clothing, eye, make up) communicated during course of active infection. Prevention is through good personal hygiene , daily laundering of bedlinens, including pillow covers and towels. No sending children to school during acute stage.

Hepatitis A: (Infectious or Viral) May have no symptoms . Adults may have abdominal pain, loss of appetite, nausea , diarrhea , light coloured stools, dark urine, fatigue, fever and jaundice. Incubation period is 15-50 days average Disease follows mild course and lasts 2- 6 weeks. Communicated through fecal -oral route, virus lasts on hands about 4 hours. More common. Later half of incubation and mostly during first week of symptoms. Prevention is through vaccines in active areas (active immunity, good hand washing, there is no long term chronic infections.

Hepatitis B: It can take 1- 9 months before symptoms develop, some have mild flu like symptoms. Dark urine, light coloured stools, fatigue, fever and jaundice. Can develop acute hepatitis, fever and jaundice, cirrhosis and cancer.

The incubation period is for 4-25 weeks . Communicated through direct contact. Prevention is vaccination Hepatitis C cause of cirrhosis and liver cancer chronic in 85% of infected people. Liver fibrosis then to cirrhosis infected people2-25 weeks; average 7-9 weeks. Disease may be dormant 10-20 years before symptoms Contact with infected blood, drug use & sexual contact. Prevention is screen blood for HCV. No vaccine due to high mutation rate.

HIV: Virus that attacks the immune system & causes AIDS throat, lymphadenopathy, splenomegaly, rash, diarrhea. Skin lesions, infections.

Influenza (flu) Viral disease. Epidemics is usually in winter. Sudden onset of fever for 3-5 days, chills, tiredness, body pains, nasal discharge, dry cough, mild sore throat. Children can also experience GI symptoms of nausea, vomiting & diarrhea although this is uncommon in adults. 1-4 daysPeak flu season is late December through March Direct contact especially in crowded areas via airborne. The virus can persist on surfaces for hours but indirect contact is less common. Contagious 1 day prior to being sick up to 3-7 days after 1st symptom.Vaccination available annually; most effective if received from September to mid- November. Treatment is symptomatic rest, fluids, OTC medicine for fever & aches.

Measles (rubeola, hard measles Initially symptoms of severe cold with fever, conjunctivitis, swollen eyelids, photophobia, malaise, cough, nasopharyngeal congestion, red bumpy rash lasting about 6 days incubation 7-14 days; average 10 days. Communicated through Inhalation of infective droplets & direct contact. Highly communicable virus mostly before prodrome starts (early or impending disease time), to about 4 days after rash appears. Prevention is through Handwashing critical. MMR vaccination part of childhood program

Pertussis Whooping cough 1st phase – common cold symptoms lasts 1-2 weeks. 2nd phase lasts month or longer. No fever. Mild cough that can become severe & violent, productive. 3rd phase – frequency and severity of coughing decreases Incubation period : 6-20 days transmitted via respiratory secretions or in an aerosolized form. Highly contagious except in 3rd phase. Communicability greatest before 2nd phase. Prevention. Mask DPT vaccination in childhood series (not sure how long immunity lasts).

Pneumonia Chills, high fever, dyspnea, pleuritic chest pain worsened by deep inspiration, cough, crackle wheeze heard on breath sounds Highest risk are the non-healthy populations Masks. Vaccination available esp for children<2 years old and adults>65 and for that post- splenectomy

Rubella – German measles Virus Generally milder than measles. Sore throat, low grade fever. Fine pink rash on face, trunk & extremities lasting about 3 days 12-19 days

Scabies: A parasitic disease of skin caused by a mite. Penetration is visible as papules, vesicles, or tiny linear burrows containing mites & their eggs. Lesions prominent around finger webs, anterior surfaces of wrists & elbows, anterior axillary folds, belt line, thighs, external genitalia in men, nipples and lower portion of buttocks in women. Itching intense esp. at night. Complications limited to lesions that get infected from scratching 2-6 weeks before onset of itching. Preexposure – symptoms develop in 1-4 days Transmitted skin to skin contact. Transfer from underwear & bedclothes only if immediate contact. Educate on mode of transmission & need for early diagnosis. No work or school until day after treatment started. Prevention is contact isolation. Disinfection for clothes & bed sheets used 48 hours prior to start of treatment .

Tuberculosis (Tb) Bacterial disease, primarily affects respiratory system. May spread to other organs. Development of disease about 6-12 months after infection. Chills, fever, fatigue, productive or non-productive chronic cough, weight loss, night sweats, hemoptysis. TB infection – person has the bacteria but are not sick & not capable of spreading the disease. May become ill if health status changes. May be treated prophylactically for now, person is ill, capable of spreading the disease. Incubation is 4-12-weeks, persons most susceptible: HIV, close contact with TB patient, immunocompromised. Repeated exposure is generally necessary to become infected so prolonged exposure increases.Universal precautions. Mask pt and self. The TB organism dies when exposed to light & air. Skin test annually. If the TB skin test is positive, will still need to be evaluated to determine if the TB is active. Incidence of TB rose in 1985, started to decline in 1992 to date probably due to improved control programs. TB can be cured with meds.

Avian or Bird Flu A contagious disease of animals caused by viruses that normally affect only birds and occasionally pigs. Wild birds carry the disease but rarely get sick. Domesticated birds get sick & die. Concern is mutation to humans. Typical influenza-like symptoms: Fever, cough, sore throat, muscle aches, eye infections (conjunctivitis), acute respiratory distress, viral pneumonia. Universal precautions. Mask pt and self. The TB organism dies when exposed to light & air. Skin test annually. If the TB skin test is positive, will still need to be evaluated to determine if the TB is active. Incidence of TB rose in 1985, started to decline in 1992 to date probably due to improved control programs. TB can be cured with medicines.

II. Non Communicable Diseases: Hypertension, Diabetes and Obesity. In the fast-paced life that many of us live today, there is a lot of conflict, unhealthy competition, and pressure to make quick money and gain power. This kind of lifestyle generates a lot of stress that leads to anger and frustration. In trying to gain mileage in mindless competition, people are likely to neglect their health and suffer from ailments like high blood pressure (also known as hypertension), increased blood sugar (known as diabetes) and many others. Although these diseases have a genetic predisposition, they have started affecting younger age groups due to undisciplined life style. These are known as life style disorders.

Causes

i) Sedentary lifestyle: Insufficient or no physical activity, no outdoor games, lack of exercise, excessive use of vehicles are some of the factors that are responsible for the above-mentioned diseases.

ii) Eating habits: Easily available fast food that is high in fat and sugar in popular food items like burgers, cakes, aerated drinks lead to obesity at young age. Can never replace the balanced nutrition provided by the Indian meal of chapattis or rice, pulses and vegetables.

iiii) Type "A" personality: People who are always focused on doing better than others rather than doing their best, those who get angry and frustrated easily and are intolerant towards others are more susceptible to lifestyle diseases.

vi) Family history of heart disease and diabetes also predispose people to these diseases.

Prevention

- Increased awareness of the reasons for lifestyle related disorders.
- Regular exercise, yoga, meditation.
- Avoiding junk food, and increasing intake of vegetables and water.

- Stress management, increased tolerance for others and positive attitude.
- Setting one's own goals for improvement rather than blindly copying others.
- Motivating people around you for practicing the above-mentioned healthy habits. It is no secret that stress (over work, grief, depression) can depress the immune system and increase chances of falling ill. Therefore, we need to learn how to handle stress in life.

INTEXT QUESTIONS

1. Short Questions

1. Write the mode of transmission of communicable diseases
2. Discuss the ethical issues and challenges in public health
3. What are the various levels of disease prevention
4. Write a note on the non-communicable diseases theory causes and prevention

II. Essay Questions

1. Discuss various communicable diseases their signs and Symptoms

UNIT - 19

FOOD BORNE DISEASES AND FOOD SAFETY

Foodborne diseases, most commonly referred to as food poisoning, is an illness caused by contaminated food items or pathogenic bacteria, viruses, or parasites. Foodborne Diseases are a major public health issue.

WHO states "Foodborne diseases encompass a wide spectrum of illnesses and are a significant cause of morbidity and mortality worldwide. They are illnesses associated with the ingestion of food contaminated by bacteria, viruses, parasites and chemicals as well as bio-toxins".

Most food borne diseases (commonly known as food poisoning) are caused by microorganisms. These are living organisms that are visible only through a microscope-bacteria, viruses, fungi and some parasites. Microorganisms that can cause diseases are known as pathogens.

These are biological hazards that can contaminate and poison food and make it unsafe to eat. If consumed, unpleasant symptoms will usually develop after a few hours.

Food poisoning also occurs where food has not been handled, stored (chilled/frozen) or cooked properly. It can be caused by eating food after its use-by date, by poor hygiene and by cross-contamination. Therefore, anyone who handles food has a responsibility to ensure good food hygiene and safety at all times. These responsibilities are covered under numerous food hygiene and safety laws and must be complied with by all food handlers.

People at risk of food poisoning are children under five years, adults over 65 years old, those with weakened immune systems and expectant mothers. In extreme cases, food poisoning can be life-threatening, especially for those who are more vulnerable. Severity of food poisoning will also depend on the species of microorganism and the amount consumed. The time between eating contaminated food and symptoms showing is known as the incubation period.

Different microorganisms have different incubation periods. Common symptoms of food poisoning are diarrhea, vomiting. nausea, high temperature (fever). Headache, chills, aching, tiredness, stomach cramps, abdominal pain. For most people, symptoms will pass after a few days, and they will make a full recovery. According to WHO, at least 200 diseases have been recorded or caused by food contaminated with bacteria, viruses, parasites or other harmful substances. Food borne diseases are caused by contamination and can occur at any stage of food production, delivery and consumption.

Causes of Food borne Diseases: Food borne illness is the result of haphazard handling, preparation or faulty food storage, hand washing is one of the ways to prevent food borne illness. Pathogens causing food borne diseases are:

1. Bacteria: As symptoms associated with bacterial infections are not seen until 12-72 hours of consuming contaminated food.

2. Viruses: Viral infections are the cause of at least one-third of cases of food poisoning. The effects of viral food borne infections are seen within 1 -3 days of consumption.

3. Parasites: Most food borne parasites are zoonotic in nature, as in it is transmitted from animals to humans.

Some commonly known food parasites are Nematodes and Protozoa

4. Natural Toxins: Many foods contain natural toxins. More than animals (the poisonous variety being rare), plants can be toxic. Plants use passive defense such as poisons and distasteful substances such as Sulphur compounds in garlic and onions. Other plant-based food items such as wild mushrooms have toxicity which are normally fatal to humans and animals alike.

Some plants contain substances which are toxic in large doses, but have therapeutic properties in appropriate dosages.

Foxglove contains cardiac glycosides and poisonous hemlock (conium) has medicinal uses.

WHO Initiatives against Food borne Diseases : WHO helped in building the capability to detect, manage, and prevent foodborne risks in member nations. Food borne diseases are a part of Sustainable Development Goal 3 and are of utmost importance towards WHO's work.WHO has come up with a 'Five Keys to Safer Food' manual to better prepare against food-related hazards. In addition, it also provides guidelines on how to process, handle and consume food to limit the spread and contact of food borne illnesses.

The core messages of the five keys to safer food are:

- Keep clean
- Separate raw and cooked
- Cook thoroughly
- Keep food at safe temperatures
- Use safe water and raw materials

Concept of food borne Disease:

Food borne disease are divided into two main types that is food poisoning and infection.

Food Poisoning: If disease is caused by infection of toxic chemical present in food, it is called food poisoning. Food poisoning is further divided into two types that is chemical poisoning and food intoxication.

If poisoning is caused by injection of chemical which is accidently or purposely added in food, it is called chemical poisoning. Eg. disease caused by injection of rat poison in food. If poisoning is caused by injection of toxin secreted by living being, it is called food intoxication. Sometimes tissue of food is itself toxic and causes intoxication. E.g. mushroom poisoning. Some microorganisms contaminate food and produce toxin in the food. If intoxication is caused by injection of microbial toxin in food, it is called microbial food intoxication.

Food infection: If a disease is caused by ingestion of viable microorganisms in food, it is called food infection. In food infection micro organisms multiply in intestinal tracts and cause disease.

There are two types of food infection that is: Invasive type and entero-toxigenic type.

Enterotoxigenic type of food infection: microorganisms produce enterotoxin in intestinal tract that cause disease. Eg. food infection caused by EPEC, vibrio cholera.

Invasive type of food Infection : microorganisms cause disease by invading through intestinal tract. E.g., food infection caused by Shigella, EIEC.

In some food borne disease, food simply serves as carrier of microorganisms and microorganisms do not multiply in food. Eg. in case of vibrio cholera, Corynebacterium diphtheria, Mycobacterium bovis In other food borne diseases food serves as cultivation medium for growth of microorganisms and microorganisms multiply in food. Eg. EPEC, vibrio parahaemolyticus.

Table 27 Difference Between Food Infection and Food Intoxication

Food infection	Food intoxication
It is caused by ingestion of viable microorganisms in food.	It is caused by ingestion of pre-formed toxin in food.
In this case microorganisms multiplies inside the host.	Microorganisms do not multiply inside the host.
Microorganisms as well as its toxin may be responsible for disease production.	Microorganisms itself is not associated with disease production and disease is caused by its toxin.
Eg. Salmonellosis, Shigellosis, gastroenteritis caused by vibrio., E. Coli.	Eg. disease caused by Clostridium botulinum, Staphylococcus aureus, bacillus cereus, C.perfrigens

Foodborne Diseases are acute illnesses associated with the recent consumption of food,The food involved is usually contaminated with a disease pathogen or toxicant. Such food contains enough pathogens or toxicant necessary to make a person sick.

Foodborne diseases are classified into: Foodborne infections and Foodborne intoxications.

Foodborne Infections Food borne infections are caused by the entrance of pathogenic microorganisms contaminating food into the body, and the reaction of the body tissues to their presence.These can either be fungal, bacterial, viral or parasitic.Food borne infections tend to have long incubation periods and are usually characterized by fever.

Bacterial Foodborne Infections include Cholera, salmonellosis, typhoid fever, shigellosis, yersiniosis escherichia coli infection campylo bacteriosis, vibrio para hemolyticus and listeriosis mycotic foodborne infections include candida , sporothrix, wangiella)

Viral Foodborne Infections include hepatitis A, Norwak virus and poliomyelitis virus Salmonellosis. The salmonellae constitute a group of organisms with over 2000 different serotypes. These organisms are capable of causing disease in animals and man when taken into the body in sufficient numbers. Many salmonella species have a wide host range. These are the organisms which commonly cause food poisoning.

Salmonellosis: Salmonella serotypes are associated with human disease and are not known to affect animals e.g., S. typhi and Salmonella paratyphi. Salmonellae are ubiquitous in the gut of human and animals and act as sources of food contamination. People who are carriers of the salmonellae contaminate the food. A heavy dose up to 10,000 -1,000,000 organisms per gram of food is required to cause infection .

Salmonellae grow well on food and can exist for a considerable period in feces and on pastures. Common food poisoning serotypes. Some of the salmonella species involved in food poisoning include; Salmonella typhimurium, Salmonella enteritidis, Salmonella dublin, Salmonella softenburg, Salmonella virchow, Salmonella montevideo, Salmonella infantis, and salmonella newport. These species are also involved in causing diarrhea in animals heat resistance. The salmonellae are killed by temperatures attained in commercial pasteurization, they can remain alive in moist earth for one year and in dry earth for 16 months, they are not destroyed in carcasses or often maintained at chilling or freezing temperatures, or in the usual pickling solutions.

Salmonella food poisoning outbreaks Sporadic cases involving only one or two persons in a household. Family outbreaks in which several members of the family are affected. Large outbreaks caused by a widely distributed infective food item. Institutional outbreaks which may be caused by a contaminated single food item.

Factors associated with Salmonella food poisoning

- Consumption of inadequately cooked or thawed meat or poultry
- Cross-contamination of food from infected food handlers.
- Presence of flies, cockroaches and rats in food environment that act as vectors of the disease.

Transmission: Salmonellae reach food in different ways; Directly from slaughter animals to food or from human excreta and transferred to food through hands, utensils, equipment's, flies etc.

Food poisoning is more likely to occur if the total number of microorganisms present is high. A smaller number may have no ill effect.

Vehicle Foods: Any food contaminated with salmonellae may be involved. However, foods commonly involved are animal derived foods such as: meat and meat products, milk and milk products, egg and egg products.

Clinical symptoms : Ordinary symptoms include abdominal pain, headache, diarrhea, fever, vomiting, prostration and malaise.

Control measures: Efficient refrigeration and hygienic handling of food. Consumption of properly cooked meat, complete thawing of frozen meats and adequate cooking. Heat processing of meat, milk, fish and poultry to destroy salmonella organisms in food Typhoid and Paratyphoid fever (Enteric fevers), Enteric fevers include typhoid and paratyphoid fevers caused by Salmonella typhi and Salmonella Para typhi A, B and C respectively the serotypes are similar to other salmonella bacteria, but unlike them, they are essentially parasites of man.S. typhi possesses capsular (vi). antigen in addition to the usual O and H antigens found in other serotypes.

Disease symptoms

- The incubation period is usually 2 weeks, but might vary between 3 and 28 days for typhoid fever and between 1 and 15 days for the paratyphoid fevers.
- The enteric fevers are generalized septic emic infections with a frequent, if not constant bacteremia during the first two weeks of the disease.
- The abdominal symptoms are severe, while fever and illness may continue for 4-6 weeks.

Transmission

- The typhoid and paratyphoid bacilli are essentially human parasites and are acquired mostly from human sources, namely, patients and carriers.
- The bacteria can be transmitted by contamination of water, milk or food by flies.

Control measures

- Hygienic control of food and water supplies.
- Detection and treatment of chronic carriers.
- Vaccination using TAB-vaccine. The vaccine contains a mixed culture of S. typhi, and S. para typhi. The vaccine protects for 5-7 yrs.

Escherichia Coli Foodborne Infection

Escherichia coli are potential food poisoning pathogens which are widely distributed in low numbers in food environments.

Control measures

- Proper cooking of hamburger and other meats.
- Avoidance of cross-contamination of foods in the kitchen.
- Good personal hygiene.

Shigellosis (Bacillary dysentery)

All strains of shigella possess potent exotoxins which are carbohydrate-lipid protein complexes.

Clinical Symptoms

- The illness begins 1 to 4 days after ingestion of bacteria and may last 4 to 7 days.
- Symptoms include watery or bloody diarrhea, fever, stomach cramps, nausea or vomiting, dehydration prostration in severe cases and convulsions in young children.
- The diarrhea which starts as a thin watery discharge quickly loses its fecal character to be composed of nothing but pus, mucus threads and blood.
- At this stage, there are agonizing pains.

Transmission

- Human cases and carriers are the only important sources of infection.
- Spread is by fecal-oral route, and person-to person transmission.
- The bacteria leaves the body in stool of an infected person and infects another person through contaminated hands, food, water or objects (toys, pens etc.).
- Flies can spread shigella germs when they get into contact with infected stool and then contaminate drinking water or food.
- Shigella organisms may remain viable in tap water for as long as 6 months, and in sea water for 2 to 5 months.

Preventive measures

- Practice good hygiene and sanitation.
- Wash hands with water and soap each time you use the ablution.
- The home and surroundings should be kept clean to prevent contamination of food and water supply.
- Proper disposal of human waste or sewage.
- Keep kitchen work surfaces clean.
- Use boiled or chlorinated water.
- Eat properly cooked of food.
- Drink pasteurized milk and other liquid foods such as juices.
- Reconstitute juice with potable water.

Cholera

- Cholera is caused by Vibrio cholera bacterium.
- Cholera vibrios are ingested in drink or food.
- The organism multiplies in the small intestine to produce a very potent enterotoxin.

Transmission

- Man is the only natural host of the cholera vibrios.
- Spread of infection is from person-to-person, through contaminated water or foods.
- Shrimps and vegetables are the most frequent carriers.
- Cholera is an infection of crowded poor class communities and it tends to persist in such areas.
- Cholera outbreaks occur either as explosive epidemics in non-endemic areas or as protracted epidemic waves in endemic areas.

Clinical Symptoms

- Cholera is typically characterized by the sudden onset of effortless vomiting and profuse watery diarrhea.
- Vomiting is seen frequently, but very rapid dehydration and hypovolemic shock.
- The frequent watery stools may be accompanied with small parts of the mucosa being liberated from the intestines.
- Death may occur in 12 to 24 hrs due to rapid dehydration.
- Patients may produce up to 20-30 stools per day, losing many litres of water and electrolytes.
- Patients therefore exhibits extreme dehydration, urine is suppressed, the skin becomes wrinkled, the eyeballs are sunken and the voice becomes weak and husky.
- Blood pressure falls, the heart sounds become barely audible and the pulse become rapid and weak just before death.

Control measures

- Provision of potable water
- Proper sewage disposal
- Proper cooking and hygienic handling of food
- Observation of personal hygiene
- Vaccination -The heat killed; phenol preserved vaccine has protection that lasts for 3 to 6 months.

Vibrio Parahaemolyticus Foodborne Infection

- Vibrio Parahaemolyticus is a Pathogenic Bacterium, whose natural habitat is the sea.
- Human infections occur solely from sea foods such as oysters, shrimps, crabs, lobsters, clams and related shellfish.
- Cross-contamination may lead to other foods becoming vehicles.

Symptoms of the Disease

- V. parahaemolyticus causes gastroenteritis and extra intestinal infections in man.
- The mean incubation period is 16.7 hrs. (range 3-76 hrs.) and
- Symptoms include: diarrhea (95%), cramps (92%), weakness (90%), nausea (72%), chills (55%), headache (48%) and vomiting (12%).
- Symptoms last from 1 to 8 days with a mean of 4.6 days.

Vibrio Vulnificus Foodborne Infection

- Vibrio vulnificus causes a severe foodborne infection

- The case fatality rate for V. vulnificus septicemia exceeds 50 %.
- In immunocompromised hosts, V. vulnificus infections can cause fever, nausea, myalgia and abdominal cramps, 24-48 hours after eating contaminated food. Vibrio vulnificus foodborne infection
- The organism can cross the intestinal mucosa rapidly leading to sepsis within 36 hours of the initial onset of symptoms.
- Cases are most commonly reported in warm-weather months and are often associated with eating raw oysters.

Viral Foodborne Infections

- Viruses are common pathogens transmitted through food.
- Hepatitis A and Norwalk-like virus (Novovirus) are the most important viral food borne pathogens.
- These viruses are highly infectious and may lead to widespread outbreaks.

Characteristics of viral food borne infections

- Only a few viral particles are necessary for the disease to develop.
- High numbers of viral particles are transmitted via feces of infected persons.
- Specific lining cells are necessary for virus replication. Accordingly, they cannot multiply in food or water.

Foodborne Intoxications : are diseases caused by consumption of food containing:

1. Bio toxicants which are found in tissues of certain plants and animals.
2. Metabolic products (toxins) formed and excreted by microorganisms (such as bacteria, fungi and algae), while they multiply in food, or in gastrointestinal tract of man.
3. Poisonous substances, which may be intentionally or unintentionally added to food during production, processing, transportation or storage.

Food borne intoxications can be classified into:

1) Bacterial intoxications
2) Fungal intoxications
3) Chemical intoxication
4) Plant toxicants
5) Poisonous animals

Bacterial Food Borne Intoxications

1. Staphylococcus aureus intoxication, Bacillus cereus food borne intoxication, Clostridium perfringens food borne intoxication, clostridium botulinum food borne intoxication staphylococcus aureus food borne intoxication.

This is a type of food borne intoxication caused by consumption of food contaminated with staphylococcal enterotoxins produced by certain strains of Staphylococcus aureus while growing in food.

Vehicle foods : Milk and milk products including pasteurized milk, yoghurt, chocolate milk, fermented milk, cream filled pastries, poultry, fish, shellfish, meat and meat products, non-meat salads, egg and egg products, vegetables and cereal products have been involved.

Reservoirs Staphylococci are found in varying numbers in air, dust, water, food, feces and sewage.

Clinical Symptoms :

- Inc. period is 1-6 hrs. after consumption of food contaminated with at least 1.0 µg of enterotoxin.
- Clinical signs include salivation, nausea, vomiting, abdominal cramps, sometimes diarrhea with prostration.
- It has an attack rate of 5-100%, but fatalities which occurs in children, the old and debilitated victims are rare.
- Duration of illness is 24-72 hrs.

Control Measures: Practice good personal hygiene including good personal conduct in food establishment and when handling food.Use of spoons when serving foods to prevent contamination of cooked foods. Fast cooling of cooked food and keeping such foods at low temperatures. Discourage consumption of left-overs

Bacillus cereus food borne intoxication: This is a food borne intoxication caused by consumption of enterotoxins produced by some strains of Bacillus cereus.

Vehicle foods: Bacillus cereus is a common soil saprophyte and is easily spread to many types of foods, especially of plant origin. It is frequently isolated from meat, eggs and dairy products, Cereal dishes e.g., rice, spice, mashed potatoes, herbs, vegetables, minced meat, cream and milk pudding have been involved in B. cereus poisoning.

Symptoms of disease in man: Emetic syndrome is characterized by nausea, vomiting, abdominal cramps and sometimes diarrhea that occur 1-6 hrs. after consumption of contaminated food. The syndrome is associated with ingestion of rice and pasta-based foods.

1. **Diarrhea syndrome:** (watery stool) abdominal cramps and tenesmus (rarely vomiting) beginning 8 to 16 hours after ingestion of contaminated food.

Prevention: Good hygiene should be observed in food establishments and by food handlers. Proper cooking of foods to destroy spores. Keep food at low temperature and fast cooling of food.

Clostridium perfringens intoxication: This is a food borne intoxication caused by Clostridium perfringens enterotoxin (CPE) produced in the gastrointestinal tract by enterotoxigenic strains of C. perfringens. The organism is found in the soil, dust, water, sewage marine sediments, decaying materials, intestinal tracts of humans and other animals.This organism is a spore-forming, anaerobic, gram-positive bacillus.

Food poisoning strains have a variety of origins including human and animal feces, abattoirs, sewage and flies.Spores produced by these organisms can resist boiling for 4 or more hours.

Cause of intoxication: Clostridium food borne intoxication is caused by the ingestion of food containing large numbers of vegetative cells of enterotoxigenic C. perfringens type A and some type C and D strains. These cells multiply in the intestine and sporulate releasing Clostridium perfringens enterotoxin (CPE). Sometimes CPE may be pre-formed in food, and once the food is consumed, symptoms may occur within 1-2 hours.

Vehicle Foods: The food involved are those that are prepared one day and served the next day.

- Foods that have been involved include red meats, chickens, fish, pork, fruits, vegetables, spices etc.
- The heating of such foods is inadequate to destroy heat resistant endospores.
- Upon cooling and warming the endospores germinate and grow.
- Cooking kills the vegetables cells of Cl. perfringens but activates surviving spores, which will germinate and multiply.
- Foods poisoning occurs when the level reaches 107 -108 cells/g of food.
- Growth is enhanced by anaerobic conditions achieved after removal of oxygen by cooking.

Mode of transmission to foods: Directly from slaughter animals, Contamination of slaughter meat from containers, handlers, dust, and water cross -contamination in the kitchen environment.

Symptoms of disease in man: Symptoms appear 6-24 hours after ingestion of a large number of viable vegetative cells up to 5x108 /g food, but not after ingestion of spores. Symptoms include nausea, intestinal cramps, pronounced diarrhea, vomiting is rare and the illness takes a duration of 1-2 days.

Prevention: Proper cooking of food and eating freshly prepared foods. Thorough washing and sanitation of containers. Hygiene handling of cooked food. Fast cooling of cooked food. Storing food in small quantities will enhance cooling. Proper reheating of cold cooked food before consumption.Storage of leftovers or unused foods in freezers.

Clostridium botulinum food borne Intoxication: Is a type of food poisoning known as botulism caused by consumption of enterotoxins, C. botulinum.

Types of foods implicated: Foods associated with anaerobic conditions such as spoiled canned meat, or hams and bacon stacked without air access, are particularly liable to be infective homemade fermented foods have been incriminated, together with smoked, pickled and canned foods that are allowed to stand and then eaten without adequate cooking. Uncooked fresh foods are safe because they are eaten before the toxin has had time to develop, while, if foods are cooked, the toxin is destroyed. Role of preservatives in meat. The salts reduce chances of growth of C. botulinum and inhibit toxin production.The danger of botulism has been the deciding factor in the formulation of food processing techniques, especially canned meat.

Mode of transmission: Contamination of food due to improper handling. Insufficient heating of food to destroy spores.

- Spores present in animal tissues e.g., meat and fish.

Symptoms of the disease in Adult human.

- The period of incubation in man is usually 12-72 hrs.
- Symptoms include nausea, vomiting, fatigue, dizziness, headache, dryness of skin, mouth and throat, constipation, lack of fever, nerve paralysis and great muscular weakness, double vision, respiratory failure and death.
- Duration of illness 1-10 days and mortality is high up to 60-100% of affected persons. The earlier the appearance of symptoms, the higher the mortality rate.

Infant Botulism: Occurs in infants less than 1 year of age following ingestion of spores in honey and syrup,the spores germinate in the gastrointestinal tract with toxin production. A high number of spores are found in feces of infants during acute phase of the disease. The number reduces as recovery progress. Symptoms are similar to adult botulism

Diagnosis Use of clinical symptoms, Isolation of C. botulinum strain from food.

Preventive measures

- Ensuring proper manufacturing practices Eg. ensure proper sterilization and preservation of canned meat
- Preserved foods possessing rancid or other odors should be rejected
- Proper heating of food before consumption to destroy heat labile neurotoxins. Food should be heated to 80^0C and temperature maintained for at least 10 min before eating.
- Packed foods are rendered safe if the brine used contain not less than 10% common salt, in weaker brines, microorganisms can continue to multiply.
- Ensuring fast cooling of food. This will ensure that spores that may be remaining do not germinate in food.
- Utmost care should be taken in the manufacture of cans, their transport, handling, storage and subsequent use during packaging of product.

Fungal intoxications

- These are caused by consumption of metabolites produced by fungi, when growing in food.
- These metabolites are called mycotoxins.
- Grains, oilseeds, fruits and vegetables are mostly involved if they are stored at high humidity (= 0.75) or if they are not properly dried before storage.
- Poor dry storage practices of grains and other foods leads to mould growth and production of mycotoxins.
- Of significance to public health is aflatoxicosis.

Aflatoxicosis

- Aflatoxicosis is caused by aflatoxins produced by the fungi, e.g. Aspergillus flavus.
- Four types of aflatoxins have been described i.e. aflatoxin B1, B2, G1 and G2 .
- Animals consuming feeds contaminated with aflatoxin B1 leads to secretion in the milk of aflatoxin M1 and M2 Effects of aflatoxins.
- When consumed in large doses, they are lethal in causing acute hemorrhagic syndromes.
- Sub-lethal doses cause histotoxic changes.
- Long term consumption of small doses cause liver tumors as these are potent carcinogens.

Prevention of aflatoxicosis : Proper drying and storage of grains and other affected foods. Quality control of potentially hazardous foods to ensure that they do not contain above the allowable limits of 20 ppb before consumption by use of appropriate analytical tests. Use of fungicides as seed dressings to protect stored cereals and other foods like pulses and potatoes against fungal invasion.

Chemical Food Borne Intoxication: This is a type of food borne intoxication arising from consumption of food containing poisonous chemicals, These may be intentionally or unintentionally added to foods as a result of producing, processing, transporting or storage. A number of substances can enter the food chain from the environment and through their use as growth promoters or veterinary therapeutics giving rise to chemical residues. Chemical substances involved.

Chemical food borne intoxication involve the following substances: Heavy metals Eg. antimony, mercury, arsenic, fluoride, lead, cadmium, cyanide etc. Pesticides and insecticides e.g., DDT, BHC Organochlorines and organophosphates. Herbicides, Fungicides Eg. organomercurials Chemical substances involved. Preservatives e.g., nitrites, nicotinate etc. Antibiotics Eg. penicillin, tetracyclines, chloramphenicol etc. Radionuclides e.g., cesium, strontium, radium, molybdenum, barium, ruthenium, lanthanum, iodine isotopes.

How chemicals enter foods

- Accidental contamination by heavy metals, pesticides, and radionuclides.
- Intentional addition E.g. preservatives such as nitrite and sodium nicotinate for color preservation and fungicides used as dressing during storage.
- Leaching from containers E.g. zinc galvanized containers by acid foods, copper surfaces, lead pipes, asbestos roofs.
- Usage: Presence of such chemicals in food as a result of use of their use in animal and crop husbandry.
- Maliciously added to cause harm (is rare).

Clinical signs and symptoms

- Chemical food borne intoxication exhibit a very short incubation period, usually a few minutes to a few hours, with an average of one hour.

- Symptoms are mainly due to effect on gastrointestinal tract and central nervous system and include nausea, headache, convulsions, gastrointestinal irritation, abdominal cramps, vomiting and diarrhea, pallor, cyanosis, blurred vision, sweatin, and collapse.
- Other signs may be due to effects on circulatory system.
- Symptoms of radionuclide toxicity depend on dose, time and organ affected.

Preventive measures

- Do not use utensils or containers that are able to leach chemicals such as antimony, cadmium, zinc, copper, etc.
- Use of colored pesticides and proper storage of the same.
- Prevent contamination of foods when using insecticides.
- Prevent acid foods or carbonated liquids from contact with exposed copper.
- Prevent misuse or avoid use of dangerous additive e.g. sodium nicotinate.
- Education of persons preparing food (e.g. possibility of Zn poisoning).
- Ensure that withdrawal periods are observed after use of pesticides and antibiotics in animal and crop husbandry.

Plant Toxicants: Example for plant toxicants is hemlock.

Bio-toxication's : These are disorders resulting from ingestion of a poisonous substance (a biotoxin) present in the body of a plant or animal.Such substances are derived from plants or animals presumably as a result of metabolic activities.

Animals' bio-toxication's : This type of intoxication occurs as a result of consumption of poisonous animals, that may be rendered poisonous by bacterial and enzymatic decomposition. Primary toxicity occurs due to inherent toxicants that arise due to normal metabolic processes. Secondary toxicity arises due to external toxicants contaminating animal tissues such as pesticides, heavy metals and drug residues.Inherent animal toxins are water soluble and heat labile. High concentrations of these toxins are usually found in viscera and dark meats.

Most human poisoning involves secondarily transvector toxins.

Poisonous Animals

Toxic fishes: They include puffers, triggerfish and parrot fish. The fish toxin affects the peripheral nervous systems. The fishes may become poisonous by feeding on poisonous marine organisms. A mortality rate of 50% may occur in humans.

Types of biotoxicities associated with fish include ciguatera poisoning, tetraodon poisoning and scombroid toxicity.

Mollusca: Mollusca may either be inherently or secondarily toxic. Poisoning is mainly due to the transvection of dinoflagellate protozoa toxins by the mollusca. Mollusca are however not harmed by ingestion of dinoflagellates. Involved toxins are stored in the digestive glands, gills and siphore from

where they poison vertebrates.Mollusca involved are oysters, mussels and clams, which feed on dinoflagellates and planktons containing alkaloids making them toxic.

Paralytic shellfish poisoning: This results from consumption of shellfish such as oysters, mussels and clams that have become toxic after consumption of toxic dinoflagellate protozoa.Mortality is about 1-22 %. There is no known antidote.

Prevention Avoiding Sea foods from waters laden with toxic dinoflagellates. Reduce toxin activity by heating above 100°C. Thorough cooking may reduce 70 % of the toxin activity in muscles. Poisonous mammals. Mammals are not commonly poisonous, but secondary toxicity may affect many of them. The toxin may be of various types e.g. heavy metals, pesticides, toxic plants, therapeutics, fungal or bacterial toxins. Most human poisoning involves secondarily transvectered toxins. Eating of unknown meats from vertebrates or invertebrate sources - a threat to the consumer. Local eating customs should be followed and local quarantine regulations strictly adhered to in order to reduce the risk. Avoid sea foods and always heat foods to above 100°C to denature the inherent heat labile toxins that may be present in animal tissues.

Food Safety: Food safety means assurance that food is acceptable for human consumption according to its intended use. An understanding of food safety is improved by defining two others concepts — toxicity and hazard. Toxicity is the capacity of a substance to produce harm or injury of any kind under any conditions. Hazard is the relative probability that harm or injury will result when substance is not used in a prescribed manner and quantity. Hazards can be physical, chemical and biological causing harmful / adverse effects on the health of consumers. Food safety means knowing how to buy, prepare, and store food to prevent the spread of harmful bacteria that cause foodborne illnesses, like Salmonella and E. coli. Access to sufficient amounts of safe and nutritious food is key to sustaining life and promoting good health. Unsafe food containing harmful bacteria, viruses, parasites or chemical substances cause more than 200 diseases, ranging from diarrhea to cancers

The core messages of the Five Keys to Safer Food are: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures, and use safe water and raw materials.

Food Safety Management Systems: Over the years, issues related to food safety and quality have gone beyond just the avoidance of food-borne pathogens, chemical toxicants and other hazards. A food hazard can enter/come into the food at any stage of the food chain, therefore, adequate control throughout the food chain is essential. Food safety and quality can be ensured through. Good Manufacturing Practices (GMP), Good Handling Practices (GHP), Hazard Analysis Critical Control Points (HACCP).

Good Manufacturing Practices (GMP): are a part of quality assurance to ensure that manufacturers/ processors take steps to ensure that their products are safe. It enables to minimize or eliminate contamination and false labelling, thereby protecting the consumer from being misled GMP is a good business tool that helps to refine compliance and performance by the manufacturers/producers.

Good Handling Practices indicate a comprehensive approach from the farm to the store or consumer, in order to identify potential sources of risk and indicates what steps and procedures are taken to minimize the risk of contamination. It ensures that all persons who handle food have good hygiene practices.

Hazard Analysis Critical Control Point (HACCP) HACCP is a means of providing assurance about safety of food. HACCP is an approach to food manufacture and storage in which raw materials and each individual step in a specific process are considered in detail and evaluated for its potential to contribute to the development of pathogenic microorganisms or other food hazards. It involves identification of hazards, assessment of chances of occurrence of hazards during each step /stage in the food chain — raw material procurement, manufacturing, distribution, usage of food products and defining measures for hazard(s) control.

Why to implement HACCP?

- It is a preventive approach to ensure food safety.
- End product inspection and testing, although important, is time consuming, expensive and detects the problems only after they occur. In contrast, HACCP enables us to detect hazards at any stage of processing or manufacture in order to ensure a good quality end product, by taking appropriate action at the stage where the problem occurs.
- It enables producers, processors, distributors and exporters to utilize resources efficiently and in a cost-effective manner for assuring food safety.
- FSSAI, 2006 places primary responsibility for safe food with producers and suppliers through HACCP, GMP, GHP. This is important for consumer protection and international food trade.
- It assures consistently good quality products.

INTEXT QUESTIONS

I Short Questions

1. Give the difference between food infection and food intoxication.
2. Give the causes of food borne disease.
3. What Is the importance of HACCP.

II. Essay Questions

1. Discuss the Symptoms of bacterial food borne infections.
2. Explain about the symptoms of viral food borne infections.
3. Describe at length various food borne intoxications.

UNIT - 20

HEALTH EDUCATION

Health education is the development of individual, group, institutional, community and systemic strategies to improve health knowledge, attitudes, skills and behavior. The purpose of health education is to positively influence the health of individuals and communities as well as the living and working conditions that influence health.

World Health Organization defined Health Education as "comprising of consciously constructed opportunities for learning, involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health".

Aims and Objectives of Health Education: Health Education aims to motivate people to improve their living conditions, develop a sense of responsibility for health as an individual, as a member of a family and as a member of a community. Educating individuals and groups of people about health-related matters enables them to behave in a manner conducive to promotion of health, maintenance of health and restoration of health, whenever it is necessary.

- Prevent diseases by informing and educating the principles of healthy living and modifying health behavior.
- Maintain health by providing knowledge and skills, motivating to practice desirable health practices.
- Promote health through adoption of healthy lifestyle.
- Utilize health services.

Importance of Health Education: Health education enhances the quality of life by reducing the chance of common illness becoming severe and sometimes fatal. As it focuses on prevention of diseases, it helps to reduce the financial burden on the individual and their Government. Health Education increases people's awareness to health issues. Health education is important because it is needed for changing people's health related behavior (change towards health and away from disease inducing things). Health Education plays a crucial role in the development of a healthy, inclusive and equitable society.

Health education is becoming increasingly important due to the following reasons:

1) "Your Health is in your Hands!" The government's health departments cannot deliver health at people's door steps. Health is something that people have to achieve themselves. The health care persons can only 'enable' them to achieve it.

2) Disease pattern in the society is changing. Communicable diseases are being slowly replaced by non-communicable diseases. Many of these do not have a cure. They need long term management i.e., people should learn how to manage their diseases over years and years (e.g., diabetes, hypertension, coronary artery disease, etc.). That means, the patients need health education.

4) These are the days of health promotion and we need to have health promoting public policies. That means all policy makers in the country working in different areas of public life (at different levels of the society) need to learn about health.

Principles of Health Education

- Reinforcement (repetition at intervals) leads to comprehension. Telling once is not enough. It is not easy for people to change their behavior. We should not expect that we tell them once and they will change once for all. We have to keep repeating the same thing. If possible, make others tell the same thing at some other time or place. This reinforces our health message; and helps them in comprehension.
- Tell in a planned sequence (for cumulative learning). If we have to tell them something complicated, let us tell it little by little in a sequential manner (means we don't tell everything at one sitting).
- Understand that people change their behavior only after serious consideration. People do not get ready to change their behavior unless they think that not changing will really lead them into problems.
- Frightening people a little may be useful. We may have to at times frighten them about the disease producing condition. But frightening too much is also not good. We have to be truthful and realistic.
- Use multiple methods to promote learning.
- Utilize both individual approach and group approach for convincing people.
- Use locally available resources.

Set up intermediate targets (changing the knowledge, beliefs, attitudes and practices). For example, you want that your diabetic patient should take insulin injections by himself. First you give him knowledge that insulin is more effective than oral drugs. Then tell him that as the oral drugs are not giving full control of the blood glucose, he is more likely to get complications of diabetes in kidneys, eyes, peripheral nerves etc. (this may change his attitude towards insulin). Later, introduce him to some diabetic who is injecting insulin himself (demonstration). Then he may believe that after all, self-injection of insulin may not be so difficult (belief). Then, one day, under your and the old patient's supervision, let him try injecting himself (trial). If he succeeds, he may adopt the new practice on regular basis (adoption of the new method). Ensure comprehension – e.g., language.

- Motivate people to make right and smart choices – Don't just impart knowledge; appeal to their emotions. Fear appeal is one method.
- Ensure participation of the person/ community.
- Utilize the services of change agents in the society – e.g., leader, teachers.
- Make sure that you have exemplary behavior.
- Make educational diagnosis – to know situational specification.
- Make strategies for sub-population – e.g., by age, sex.
- Aim at health promotion – not just at health education.
- Motivate people to invest in health for good returns.
- Help people in decision making process. 'Significant people' of the person have a lot of influence in his decision making for health.

- Enhance the self-esteem of your clients - Try to increase your clients self-respect. Those who have high level of self-respect are likely to follow your advice better.
- Utilize peer-teaching - People like to learn from their peers (people who are like themselves). A diabetic is more likely to accept injection treatment, if other diabetics advise him. Self-help groups like Diabetics associations, alcoholics anonymous work by utilizing peer teaching.

Understand that a new idea spreads in a community slowly - When we introduce a new idea into a community (e.g., use condom to protect from HIV), it does not spread so fast in the society. It takes some time. First it is adopted by people who are adventurous and creative. They are the ones who adopt the new idea first. When mass media advertisements come, the idea becomes a social fashion. People who are conservative in nature, who are afraid of adopting something new (unknown thing) and people who are bound to customs and traditions would not like to adopt the new idea.

Important Areas for Health Education These include:

- Environmental health
- Physical health
- Mental health
- Social health
- Emotional health
- Intellectual health
- Spiritual health

Behaviors that Promote Health

Here are mentioned some behaviors that promote people's health:

- Adoption of health promoting behaviors eg. breast feeding, weaning, oral rehydration, latrines, child spacing, hygiene practices, tooth brushing, taking malaria prophylaxis, etc.
- Reduction of health damaging behaviors: eg. smoking, bottle feeding, alcohol consumption, accident prone kind of risk-taking driving.
- Utilization of health services: eg. ante-natal services, child health services, immunization, family planning, participating in screening programs.
- Recognition of early symptoms and prompt self-referral for treatment: e.g. cancer, tuberculosis.
- Following of drug regimens: e.g. six months DOTS treatment for tuberculosis.
- Action for rehabilitation for minimizing further disability.
- Action to improve sanitation and hygiene: e.g. washing hands with soap, not eating unhygienic food on road side.

Approaches to Health Education

(A) Individual approach

Health education is provided either in the hospital, school, workplace or at the home of the patient. Providing health education has traditionally been the prerogative of the treating physicians and nurses. But now we feel that health education is the job of all the health care personnel. General Healthcare Assistants (GHAs) have more contact and thus more opportunity to disseminate the health-related information. So, a GHA has to prepare himself/ herself for playing the role of Health Educator. The health educator must create an atmosphere of friendship and allow the individual to talk as much as possible. Being a good listener is important. The advantage of the individual approach lies in the fact that the educator can discuss, argue and persuade the individual to change his/her health-related behavior for the better. Proper seating arrangements and appropriate physical environment are needed.

(B) Group Approach

The educator talks to a group of people. This can be of many types:

- **Lecture:**

This is the traditional method of teaching as happens in the classroom. It is usually done as an oral presentation of relevant information by a qualified person to an audience. Lectures can be made more effective by exhibits.

- **Group Discussion:**

A very effective method, where a group of people (usually peers) freely express their views, share information and influence each other. They ultimately reach a consensus, or a course of action to be followed. Groups usually consist of 5 - 15 members for maximum effectiveness. A group leader or 'moderator' indicates and steps in the discussion during crucial or decisive moments.

- **Demonstration of skills:**

Here, procedures or skills are demonstrated by qualified persons. This is usually done step by step and with explanation for each step. The aim is to teach the audience how to perform the same procedures or skills.

Other methods for group communication include symposiums, workshops, panel discussions and role-playing.

(C) Mass Approach

Radio, television, internet and print media reach and communicate the masses, and cover large populations in short time. Mass media is most cost effective. It is primarily used to generate awareness and disseminate facts among masses. It needs to be supplemented with individual and group approach to facilitate adoption of healthy practices. It must also be supported by quality health services to achieve the desirable success.

Steps in Planning of Health Education Program

1. Find out the needs and background of the target group, their age, sex, knowledge, skills and education, socioeconomic condition, language they speak, beliefs, values, attitude, their media habits, health problems, felt needs, their common health practices, etc.
2. Know the locally available resources, meet influential people, community leaders.
3. Identify the topic, prepare the contents.
4. Decide where the health education program should take place, it could be at a primary health center, in the hospital ward, at home, in a community center etc.
5. Decide what method to use, one-to-one, small group or large meeting, demonstration, exhibition, drama etc.
6. Decide what audio-visual aids would be needed to support the program, leaflets, models, slides, real objects etc.
7. Involve the community in the planning process.
8. Decide how you will evaluate the outcome of the health education (short-term and long-term evaluation).

A **health educator** is "a professionally prepared individual who serves in a variety of roles and is specifically trained to use appropriate educational strategies and methods to facilitate the development of policies, procedures, interventions and systems conducive to the health of individuals, groups, and communities" (Joint Committee on Terminology, 2001). As a Health Educator you are here to help and enhance the health of others.

- Assess individual and community needs
- Plan, develop, coordinate and implement health education programs
- Manage health education programs & personnel
- Evaluate health education programs
- Write grants
- Build coalitions
- Identify resources
- Make referrals
- Develop social marketing and mass media campaigns
- Organize/ mobilize communities for action
- Handle controversial health issues/content
- Advocate for health related issues
- Encourage healthy behavior
- Use a variety of education/training methods

- Develop audio, visual, print and electronic materials
- Conduct research
- Write scholarly articles

Population control and family welfare

India is the second most populous country in the world, next to China. India comprises more than 15% of world's total population. The population of India was about 24 crores in the year 1901. Except for a slight fall in 1911-21, the population of India has been steadily increasing for the last 100 years. As per the census of 2001, as on 1st March 2001, the population of India was 1,027,015,247, that is about 102.7 crores. This alarming rate of rise in human population is a cause of concern.

Factors responsible for population explosion in India

- Advancement in leading to less of starvation and malnutrition.
- Advancement in medicine which led to increase in life span. Thus, more and more people live longer, reach reproductive age and produce more children.
- Prevailing social custom and beliefs because of which people do not accept family planning measures, leading to rise in population.
- Advancement in industrialization helps in better storage and distribution of food, more employment opportunities and more prosperity.
- A large proportion is still illiterate. They are not aware of the functioning of reproductive system and hence the consequence of overpopulation.
- Children instead of attending school go to work and increase the income of the family.
- Desire for a male child. The parents want to have at least one son and, in this process, they give birth to many children sometimes.

The problems posed by increasing population are of two types:

1. Problems posed by large families: Are health of the mother, poor housing, economic pressure, poor health and illiteracy.

   a) Problems posed to the Country: Urbanization and environmental degradation, Increasing population and transportation, agriculture t and environmental degradation

   b) Increasing population and more food requirements: For this purpose, new agricultural land has to be created. Feilds have been cut down for cultivation. Due to deforestation, excessive irrigation and natural hazards (floods ,land degradation land wasteland is increasing, increased use of fertilizers and pesticides to boost agricultural productivity has immense adverse effects on land and water resources of our country

   Increasing population and water: availability of water is limited, increasing population needs more water for drinking, bathing, washing etc. Thus, availability of water is becoming scarce, Increasing population leads to depletion of mineral and depleting energy sources.

Social Measures can be implemented -

i. **Minimum age of Marriage:** The minimum age of marriage should be strictly enforced. In India minimum age of marriage is 21 years for men and 18 years for women, fixed by law, which should be widely publicized

ii. **Raising the Status of Women:** Women should be given equal opportunities to develop socially and economically.

iii. **Spread of Education:** Education changes the outlook of people.

iv. **Social Security:** More people should be covered under-social security schemes, so that they do not depend upon others in the event of old age, sickness, unemployment, these facilities can have lesser desire for more children.

2. Economic Measures

i. Development of Agriculture and Industry: If agriculture and industry are properly developed, large number of people will get employment. When their income is increased, they would improve their standard of living .

ii. Standard of Living: In order to maintain their higher standard of living people prefer to have a small family.

iii. Urbanization: It is on record that people in urban areas have low birth rate than those living in rural areas. Urbanization should therefore be encouraged.

3. Other Measures are Family Planning

Publicity, Incentives, Employment of Women, Family welfare

Prevention of Substance Abuse

It is a matter of great concern that use of tobacco, alcohol and drugs is on the rise world over especially among youth. Young people are more vulnerable as they are curious and like to try out new things. On the other hand tobacco and alcohol companies especially target young people in their media campaigns.

Drug is a chemical substance that changes the way body works. Some chemical drugs are used as medicines for the treatment of physical and mental ailments. Drugs prescribed by the doctors and sold at medical stores are legal drugs. There are however, a large number of illegal drugs like cocaine, LSD, heroin, brown sugar, ganja, bhang (Marijuana).

When drugs are taken for reasons that are not medicinal, especially, if they are taken for pleasure or false sense of happiness, it constitutes drug or substance abuse. Cigarettes contain nicotine which narrows blood vessels, increases blood pressure and may cause heart disease and respiratory infections. Tar also causes cancer of lung and throat. Cigarette smoking is not only harmful for the smoker but its poisonous fumes also harm the people around the smoker (passive smoking).

There is no single reason for drug addiction. Some common reasons are mere curiosity, for excitement and adventure or under peer pressure. Desire to do more physical and mental work than one's capacity, to overcome pain, boredom, fatigue, depression and stress , false idea that taking drugs once will not make any difference.

Organizations and agencies working for public health

NGOs contributing to Healthcare Services in India

- Help Age India, CRY-Child Rights and You, Lepra Society. Smile Foundation, Rural Health Care Foundation, Udaan Welfare Foundation., Deepalaya, Doctors For You.
- Rural Health Care Foundation. Swasth Foundation, Foundation for Mother and Child Health. Swasthya Swaraj, Doctors For Seva Arogya Foundation (Aarogya Seva)
- Movement for Alternatives and Youth Awareness (MAYA) SEARCH (Society for Education, Action and Research in Community Health)

INTEXT QUESTIONS

I Short Questions

1. Give the importance of health education.
2. Write the approaches for health education.
3. What are the steps in planning a health education.
4. Give the measures for Population control and family welfare.
5. Mention the organizationsworking for public health.

III. ACTIVITY

Suresh knows that drugs are harmful. But taking drugs and watching adult movies is now very common among his friends, and they tempt him to try drugs almost every day. He is thinking of giving in into peer pressure.

(i) Do you think his decision is right? Why or why not?

(ii) Can you suggest to Suresh at least three different ways of refusing his friends and not trying out the drugs?

Yoga, exercise, sports, music, reading etc. help in releasing stress. How do you manage stressful situation during examination?

MODULE V
RESOURCE MANAGEMENT

UNIT - 21

RESOURCE MANAGEMENT

Resource management mainly deals with achieving any set goals with the available resources to be it sufficient or insufficient, without compromising on values behind it. This module mainly covers definition and importance of Management, Management process, Elements of Management, Types of Resources and Characteristics of Resources, Time and Energy Management, Household Equipment and their Care and Maintenance, Residential Space Management and Conservation of Environmental Resources.

After studying Resource Management, the student will be able to:

- Comprehend the elements of management and steps in management process
- Gain knowledge about time and energy strategies
- Understand the care and maintenance of different equipment used by households
- Gain insight into the space management issues in residential buildings
- Understand the importance of conserving environmental resources

Management is the manner of handling an institution- be it a firm, or farm or an industry or a family. In simple words management means 'using what you have to get what you want'. All management activities of the family are directed towards achievement of family goals, which ultimately leads to maximum satisfaction of the family members. For this the family members use the resources available to them and work towards creation of necessities for achievement of family goals.

Definition:The simple definition of Management is "to use what you have to get what you want". In other words, Management is a purposeful behavior involved in the creation and use of resources to achieve goals. It is a simple process by which all goals can be achieved easily. Management consists of series of decisions, making up the process of using family resources to achieve the goals.

Management is a process of planning, controlling and evaluating the use of resources of the family- i.e. human resources like knowledge, abilities, energy, skills and interest; non-human resources like money, community facilities and time- for the purpose of attaining the family goals against the set standards and values.

Importance of Management

1. Management increases initiative and innovation.
2. It increases the satisfaction with better utilization of resources.
3. It reduces the wastage of human, material and financial resources.
4. Management encourages employees to work as a team. It develops a team spirit in the organization.
5. Management uses different techniques to reduce absenteeism and labor turnover in the organization.

The Management Process

The management process will increase the probability of attaining the desired quality of life. The use of

management process also helps to maximize the use of resources in the desired manner.

A process is composed of a series of actions or functions to bring about an end result. The management process consists of a series of five progressive and interdependent managerial activities often called subsystem or functions of management.

Management Process

Planning to Achieve Goals: Planning includes setting goals, establishing priorities among goals, establishing standards for measuring goals attainment and determining the activities needed to reach the set goals.

Organizing for Performance: Organization is the logical arrangement of activities to be performed with in the plan. It includes dividing responsibilities in among the group / family, delegating authority, scheduling, and synchronizing activities.

Implementing the Plan: To implement is putting the plan into action. It involves careful observation of the work performance as per plan.

Controlling the Activities / Resources: Controlling helps in successful completion of the plan and conservation / use of resources as per the plan. Directing and guiding are also part of the controlling process.

Evaluating the Results in Light of the Goals Achieved: It is the assessment of the whole management process in achievement of the set goal of the family, the resources usage and the quality of the result produced through the process.

All the above activities must be carried out in the Management process regardless of what resource or combination of resources are utilized.

Elements of Management

Values: Values give meaning to life, and they answer the question of why people make selections from alternative courses of action. Values are motivating factors in human behavior. They provide a basis for judgment, discrimination, and analysis. Values grow out of human interests and desires. They are the products of the interaction between an individual and some object or situation in his environment.

Values may be classified as means to an end or as ends in themselves. The means to an end values are also called as instrumental or extrinsic values and the ends in themselves are called as intrinsic or ultimate values.

The intrinsic values are desirable and self-sufficient and are the quality of an experience. These are important and desirable for the individual sake.

Example: The happiness you enjoy by watching a beautiful sunset or by seeing a cute baby's dance.

The instrumental values or extrinsic values are those used to achieve an end of satisfaction. They are the means of attaining higher values. These values are used as a means to attain some other value rather than an end in itself. These can be viewed as tools for demonstrating other values.

Example: Efficiency is the instrumental value to achieve the higher value of improvement in the quality an activity. Some values possess both intrinsic and instrumental characters.

Example: Sports or play in both intrinsic value for satisfaction and instrumental for better health. Similarly, comfort, art, knowledge, ambition and religion are the examples for possessing both intrinsic and instrumental value characters.

Goals: Goals are the ends towards which every individual or the family works. They are more definite than values and can be accomplished. They are more specific, tangible and can be easily understood. Goals are the intellectual products and fully present in consciousness and are explicit.

Goals differ in the amount of time required to attain them. The three most familiar types of goals according to the time needed to achieve them are

- Long term or Ultimate goals.
- Intermediate or Short-term goals
- Means-ends goals leading to other goals.

Long term goals are considered fairly permanent. They are sought over long periods of time and consequently, are ever present. Although they may be the first goals a family formulates, they are usually the last a family achieves. Long-term goals that are worked toward for more than five years are of great importance, because they imitate and influence many of the intermediate range goals.

Intermediate or Short-term goals are ways to achieve long term goals. Intermediate goals are achieved in from one to five years and are more definite than long term goals. It is easier to form a clear-cut picture of them. These intermediate goals frequently involve making decisions or selections, sometimes unconsciously, from among several alternatives, because it seems that they will prove the best means to attain certain long range / term goals.

Means-end goals are less complex. They are the steps or activities that are necessary to reach other goals. There are many means-end goals that are ends in themselves and that are reached with a small number of activities, Ex- writing a check to pay bills, preparing a meal. Through frequent means-end activities one attains the intermediate goal.

Standards: Standards are the specifications of values. They are set of criteria stemming from value patterns, determining the amount and kind of interest in an item or activity, and the satisfaction received.

They may be defined as “mental pictures of what is considered essential and necessary to make life tolerable”.

Conventional and Non- conventional: The traditional standards, which are accepted by generations, are still held high by the people in a country is called conventional standards. They arise from the values held high by the society at large. They are accepted as mannerism or basic of good behavior. Ex. Opening of a door of car for women as a mark of respect. **Non-conventional standards** are flexible in nature and change with time. Ex. Number of uses of two-in-one furniture like sofa-cum-bed in the house. These standards allow an individual to choose their own procedures and working style.

V. Resources: Every individual and family has a number of resources available which may or may not be fully used by the family. Sometimes the individual or the family may not be aware of these resources. They vary for individuals, communities, states, and nations. However, all types of resources are used to achieve the family goals.

Nickel et al (1976) defined resources as "the assets that can be used to accomplish goals".

RESOURCES - CLASSIFICATION AND CHARACTERISTICS:

They are Human resources and Non-human resources.

1. **Human Resources:** Human resources are less tangible and can be easily determined. These resources are used for productive purpose. They Originate internally and constitute the personal characteristics and attributes. Human resources cannot be utilized independently of the individual. These are the resources available to you as a person you have become, in terms of education, occupational status, skills, attitude, traits, and other personal characteristics.

2. **Non-Human resources:** Non-human resources are external to the individual but are possessed, utilized or controlled by the family. These resources are very much essential for the achievement of goals and are limited in their availability.

   Non-human resources include the personal possessions, family possessions and the resources available to the individual with his/ her community, state and nation. Money is the purchasing power, used to get other resources or achieve goals or attain satisfaction.

Characteristics of Resources

i. All resources are useful: The definition of resource itself is indicative of this characteristic. All resource have utility, which means they have the want satisfying power.

ii. All resources are limited: All resources are scarce, and some are more scarce.

iii. All resources are interrelated: People often may have to use a 'resource mix' or combination of different resources to achieve the family goals. This combination or mix of resources differs from individual to individual and family to family.

iv. Resources are accessible: Resources are those assets, which are accessible for use. Skills of children become family resource only when children are available to help the homemaker.

v. Resources are interchangeable: All resources to a certain extent can be substituted for or interchanged with another resource.

INTEXT QUESTIONS:

I. Short answer questions

1. What are the different types of goals and values?
2. State the characteristics of resources.

II. Long answer questions

1. Explain the steps in management process.
2. Give the classification of resources with suitable examples

III. Activity

List down any three long term goals that you have in your life; mention the resources required and standards set.

UNIT - 22

TIME AND ENERGY MANAGEMENT

Time management is a significant aspect of the management of all resources. It is required for every human being irrespective of their nature of work –be it a labor, student, housewife, professional or any job holder or unpaid worker. Everyone has 24 hours in a day and time is one resource which is equally distributed to every individual, both rich and poor share the time alike. Effective time management needs the realization of the fact that time has value. It can be used carefully and fruitfully according to the demands.

Time management is defined as 'gaining control over what you do, when you do it, how you do it and why you do it.'

Steps in Time Management

List all items to be Included, Grouping under Flexible and Inflexible: In some cases, there is only a fine line separating flexible from inflexible items. For example, going to classes is inflexible for a student, or feeding the baby is inflexible for a homemaker, whereas dusting one's bedroom or living room is a flexible task, which need not be done at a fixed time. It is equally important to break down lengthy or complicated tasks into parts. Not only are parts easier to grasp and to check on later, but they are easier to face and perform. Thus, these activities are to be listed and arranged in a sequential order.

Set Down as Accurate an Estimate of Time for Each Task as is Obtainable: Settings down of time estimates may be accomplished in one of two ways: Either the person uses their own time norms found through long experience or through keeping a few records of repetitive tasks or they must estimate as best the can, the time required for each part of their schedule, get such information from other sources such as friends, relatives or books. This time estimates are important, because the homemaker who takes two hours to clean a closet today should know that they cannot clean three closets in the same amount of time tomorrow or on any other day. Thus, estimating the required time for each task is important, prior to the preparation of a final time schedule.

Bring Total Estimated Time Needed and Total Available Time into Harmony: The third step in making a time schedule, bringing needs and wants into harmony, is the same process as that applied to the more tangible resource-money. This is done generally and felt more in the preparation of a budget in the financial management. This step calls for an adjustment. The earlier activity of listing flexible and inflexible plays an important role here.

Determine Time Sequence: It requires both listing jobs in order and determining logical times when they are to be done. Such as, build around the tasks that are fixed both as to necessity of performing them and/ or clock time when they must be done, alternate light and heavy jobs as far as possible, include elasticity periods without fail. Sequence of activities can be planned most effectively, if we take into consideration the aspects such as fixed jobs, regular, routine, rest periods and the warming up period. This step requires a lot of care, since one has to bring a good balance in the use of time resource.

Write Out Plan: Now check the above sequence of activities before preparing the actual final plan of

action. If the period planned for is short enough and soon enough, so that all the preceding steps may be accomplished while the plan can be remembered. Forms for writing out time plans vary from a separate card for a day with a few notations to a week's or even a month's plan. It all depends upon the convenience of the person for whom the plan is made.

Merge Individual Plans with Others for Co-ordination: The carrying out of the last step depends upon whether one is working alone. A homemaker may need especially to co-ordinate their plans with those of other family members, specially, that of the adult members in the family, like their partner grown up children, elderly parents etc.

- Time norms both individual & established, the information about peak loads, light and heavy tasks and the requirement of rest periods help us to list the items,
- Group them as flexible and inflexible, and also set down accurate estimate of time required each activity
- Wishful thinking should be avoided
- Breaking down jobs into parts maker a time plan flexible
- Including elasticity or flexible periods and alternating heavy and light jobs ensures the success of the plan similarly combining and dovetailing jobs also helps.

Time Management Strategies

i. Rest Periods: This is the third tool for time management. A rest period need not mean a complete break from work, although that is desirable after a heavy manual labor. The greatest results can be expected if the worker lies down and relaxes completely, because reclining requires less expenditure of energy than any other body position. As compared to most workers, the homemaker can provide good conditions for rest more easily. A change in the type of work may also serve as rest periods for each other.

ii. Time plan: Steps in time plan include

- Planning whole day schedule
- Useful in planning to save energy and time
- Relieving the tension of indecision and uncertainty.

iii. Peak loads: This is one of the important tools to be considered while managing work time. For most people activities pile up on each other at certain times of the day or the week or the month or the season. These packed periods are called PEAK -LOADS.

For example, for a homemaker peak load can be daily, weekly, or seasonal such as the time of breakfast and getting the family off for the day is a daily peak load, the thorough cleaning of the house is a periodic peak load and festival preparation is a seasonal peak load.

Methods to avoid peak load:

- Avoid last minute rush

- Distribute rush
- Complete regular work in advance
- The peak load may be lessened by delegating some work to other family members and by adopting some work simplification methods.

Energy Management

Energy is the basic requirement of every person for maintenance of life, growth, and physical output.

Types of work

Based on the amount of energy expended, the tasks are divided into three classes:

1) Light Work which requires less than 2 calories per hour
2) Moderate Work which causes an increase of energy expenditure of about 24 calories per hour and ironing dressing an infant, washing dishes.
3) Strenuous work which increases the energy expenditure about 50 calories per hour Eg. sweeping.

Work Simplification Methods

Work simplification is managing the two interrelated resources of time and energy blended together. It is defined as accomplishing; more work with a given amount of time and energy was reducing the amount of either both to accomplish a given amount of work.

In any given job, energy consumption can be reduced by,

a. Developing an improved mental attitude towards the work to be done.
b. Eliminating unnecessary steps or combining new steps and processes in work
c. Arranging steps in any activities in a sequence
d. Using efficient equipment and other materials for convenience.
e. Arranging needed equipment and other materials according to convenience.
f. Maintaining correct body posture while working
g. Developing rhythm in doing work.
h. Improving skills and techniques.
i. Doing work with rightly spaced adequate rest periods.
j. Developing motivating conditions in work situations.

Fatigue and ways to reduce fatigue

Fatigue means tiredness from physical work or lowered capacity to perform subsequent work.

Fatigue can either be psychological or physiological. Due to fatigue, our body's capacity to do work is reduced. In order to avoid fatigue, either rest period should be introduced between the work, or the

job should be made more interesting. Besides these, the worker can either be appreciated or given some incentive, so that the worker gets motivated to do work more efficiently and effectively. There are basically two types of fatigue. They are:

- **The physiological fatigue:** Sometimes also called tissue physical impairment.
- **The non-physiological or psychological fatigue or subjective fatigue:** This psychological fatigue can again be subdivided into two types i.e., boredom and frustration.

The home maker can take some of the steps listed below to remove or avoid fatigue, so that they can continue to perform their works.

- To alleviate physiological fatigue, there must be cessation of physical activity to allow time for fatigue products to be removed from the body
- Change of task will lessen the discomfort i.e. alternating light and heavy tasks.
- In reducing boredom fatigue, it is wise to remember that small changes in the task may be helpful, or that interest outside the job may be introduced, such as listening to music.

An analytical Approach to a Job:

This comes through changed procedure and actually reduces the physiological fatigue and at the same time creates interest in the work itself.

Stress is still another casual factor inducing fatigue. The occurrence of stress may stem from the task being undertaken or from human factors.

- Adopt a positive mental approach to exercises and diet and try to make them a part of your daily routine.
- Adopt a healthy lifestyle by incorporating Yoga and Meditation in your routine.
- Involve yourself in recreational activities such as reading, watching T.V. listening to music etc.

INTEXT QUESTIONS

I. Short answer Questions

1. Mention the tools of time management.
2. How to reduce the fatigue?

II. Long answer questions

1. Explain the strategies of time management.
2. State the ways of conserving energy in work.

III. Activity

Explain any household activity from your home and give the simplified version of the same activity.

UNIT - 23

HOUSEHOLD EQUIPMENT - SELECTION AND CARE

Kitchen utensils and equipment can be kept and used for a long time with proper care and careful handling. Equipment of various types is used in Indian homes, made of various materials such as silver, aluminum, stainless steel, brass, iron, glass, China clay and so on.

Aluminum: Aluminum utensils generally used in Indian homes are made by two forms. Stamped utensils are made from sheet of aluminum that have been rolled to the required thickness under great pressure eg. measuring cups, spoons, strainers, graters etc. Cast utensils are formed by pouring molten metal usually aluminum or iron in a mild cast utensil have a plain edge at the top and the handle or shank to which the handle is attached being cast in one with the pan. These articles can be cleaned with hot water and soap. Ash can be used for cleaning them. Do not use salt or alkali such as soda, as they darken and destroy aluminum.

In case the aluminum article is stained those stains can be cleaned with apple peelings boiled in water and can be polished by rubbing with whiting. If greasy, these vessels should be steeped in hot water, and may be washed with hot soapy water, using steel wool or coconut fiber, or cleaned with tamarind or lime. Stains and smoky deposits may be removed with steel wool or coconut fiber, using vim. If inside of the vessel is stained badly, water to which a little vinegar is added should be boiled in it for about half an hour. This will loosen the stains. After removal of stains, they should be rinsed with cold water and dried with a wet cloth.

Stainless Steel: Steel is lighter in weight than iron and can be forged, rolled, drawn, or stamped. Hard steel which has 1% carbon is used for knives, raggers, where sharp cutting edges are required. While soft steel contains 0.1% of carbon, used for making various types of utensils.

Whereas in stainless steel some of the carbon has been replaced by chromium and nickel. It is mainly used for built in cooking surfaces, wall ovens, sinks, counter tops, appliances, flat ware etc. If it is greasy, do not use pumice stone on steel, but rub with powder. Bath brick is generally used with a wet cloth.

Stainless steel can be cleaned in the same manner as aluminum i.e. of greasy stainless steel vessels should be steeped in hot water or in cold water. They may be washed with hot soapy water using steel wool or coconut fiber or with hay. Stains and smoke deposit may be removed with steel wool or coconut fiber using vim. If the inside of the vessel is stained badly little vinegar is added and should be boiled in it for about an hour. This will loosen the stains. After removal of stains, they should be rinsed with cold water and dried with wet cloth.

Iron: Iron is obtainable in two forms cast and sheet; Sheet iron is frequently warps if subjected to high heat while cast iron is heavy and rather brittle, will corrode. The rust formed on damp iron is red iron oxide.

While cleaning these utensils first the grease should be removed with wastepaper and the vessel to be scrubbed well with steel wool and wood ash in hot soap water. Then it should be rinsed in cold water and allowed to dry. A small amount of grease applied to the surface of the vessel will prevent it from rusting. Utensils used mainly for cooking purposes and placed directly on the fiber collect a cot of soot at the bottom. Care should be taken to remove this. In some Indian homes a mild coat of wood ash or

cow dung ash mixed with a little water is applied to the bottom of the vessel. This facilitates the easy removal of soot.

Galvanized Iron: It is used for sinks and pails. Wash galvanized iron as you would wash cast iron. Rub a few drops of oil over the surface to prevent rust where the galvanized coating has worn off. Rust is a reddish powdery substance, which forms on Iron when iron is allowed to remain damp. It is caused by the surface of the iron combining with the 0_2 in the air and forming a new substance called iron oxide. 02 also combines easily with other substances and forms oxides.

The main parts of cooking stove consist of iron and steel. After cooking, wipe off, the grease of remains of food on the stove with a newspaper Wash with hot soap suds and wipe again with clean newspaper. Occasionally rub the stove with a cloth just moistened with kerosene. A special blacking can be applied with a brush for cleaning stoves, but it is more troublesome to keep stoves clean by this method. Cleaning with newspaper instead of cloth saves much trouble in washing cloth dirtied by soot and grease. A small hard bristled brush is best for cleaning out the corners of iron cooking utensils. Small mops are also useful.

Copper: It is used for electric wiring and seldom used for cooking utensils except as a plating or for the bottom of stainless steel. Vinegar and salt can be used to remove the tarnish on copper utensils.

Brass: It is an alloy of copper and zinc and more resistant to corrosion. It is used largely for decorative pieces rather than for cooking utensils. Copper and brass tarnish in the presence of carbon dioxide and form verdigris, which is a poisonous carbonate. If metal is badly tarnished, wash, it with a soda solution.

For ordinary cleaning of the brass and bronze tamarind should be applied with a little water and rubbed well. Fine brick powder may also be used with coconut fiber. The article may then be rinsed thoroughly in clean water and dried. This metal ware can be cleaned with lime juice or vinegar and a fine powder.

Stains on vessels can be removed by applying a cut piece of lime and salt. After drying polish, them with brasso or any soft powder and a soft cloth. Brass fittings such as doorknobs, handles, water taps should be polished with the brasso polish after the cleaning. Too much polish should not be used, as it will make the things sticky and less shining. In case of brass ornaments, they should be first washed with hot soapy water. The hidden parts of the ornaments should be cleaned with toothbrush. After this the ornaments should be washed with plain water, dried, and rubbed with a clean, soft cloth finally they should be polished with brasso.

Bronze and gun metal: It is an alloy of copper and tin. In olden days it was used for cooking utensils but now it is used for decorative purpose. Gun metal is an alloy of copper and silicon or copper and zinc. Generally, it is used for the autoclave inner turnings.

Silver: Silver can be used as cutlery, tea sets, cold drink sets and decoration pieces in houses. They are all delicate articles and get easily scratched by rough handling. Hot soapy water should be used for washing them. Use of salt on the silver articles can remove egg stains. A paste made of whiting and water can also be used for cleaning silver articles. Use of diluted NH_3 or methylated spirit is also good for silver articles.

Silver articles can also be cleaned by putting the articles in hot water containing little soda. Electroplated articles made of white metal coated with silver need special care because of the use of few metals. No metal polish should be used on such articles. Don't use acid on silver. Silver tarnishes in the presence of

Sulphur and forms Sulphur sulfide. It should be polished with a leather known as `chamois leather' or by `silvo'.

Glass: It is used especially for windows, sliding doors, drinking glasses etc. Glass has low conductivity but absorbs heat well. If milk stained, cold water should be used to rinse off the grease and prevent it from sticking to the glass. Then it should be washed with warm water and soap, rinsed in cold water and dried. Once a week vinegar should be added to the washing water to brighten the glass. If the glass ware is dirty or greasy, hot soapy water is required for washing and hot water for rinsing. Glassware must be rubbed dry and polished with a soft cloth. Finally, the glass should be polished with a piece of smooth linen or tissue paper. Glass klenzet is used to remove the stains.

Pyro Ceram: It is non-porous ceramic material mainly used for the top of the range, sinks, oven utensils etc. It provides smooth surface. This surface should be thoroughly cleaned with fine scouring powder like vim. If it is greasy, a little soda may be put, and boiled water poured on it to clean.

Plastics: These are light in weight but strong, colorful, resistance to moisture and good insulators of heat and electricity, and easy to clean. These are of two types.

Thermo plastics are softened by heat but harden again when cooled, and this change may be repeated several times without alteration in the physical properties. This group includes polyethylene, polystyrene nylon, vinyl, acrylics and flouro plastics.

Polyethylene is used in bottles for milk, bleaches and detergents, squeeze bottles for cosmetics, semi rigid mixing and refrigerator bowls, juice containers, coffee can lid, dish pans, food storage bags and in sheet form for economical table cloths and good wraps.

Like polyethylene, large quantities of polystyrene are being used in packaging applications. Disposable drink cups, cottage cheese containers and foamed meat trays are common place.

Nylon is used for gears in sewing machines, for bearings in eggbeaters, for the roller parts in drawers and sliding shelves in refrigerators, and cabinets and for other parts of pumps.

Vinyl comes in both flexible and rigid varieties. Refrigerator gasketing, floor tiles, place,mats, upholstery material are familar uses of the flexible types.

Acrylic is used in lighting fixtures because of its high transparency, good diffusion characteristics.

Fluro plastics are basically non-toxic and essentially free of odor and taste. They are not affected by water or by normal concentrations of household chemicals.

Thermo setting Plastics: ‘melamine, phenolics, polyesters, urea, and polyimides.

Melamine, obtainable in a wide variety of translucent and opaque colors is made into dinnerware, mixing bowls, and is used for laminated counter tops.

Phenolics are opaque and dark in color, usually brown or black. They are used for light plugs and switches, appliance bases, washing machine, agitators, and telephones. Polyester is used for appliance housings and light weight laundry tubs.

Polymides are used as exterior coatings on cooking utensils. Urea is manufactured into buttons, cosmetic jar tops, electric plugs, and picnic ware. Members of this group are resistant to heat, moisture, and scratches.

Plastics are easily cleaned with a damp cloth, or by washing in lukewarm water with mild soap or detergent. Abrasive household cleaners, steel wood or sandpaper will scratch the surface and should not be used. Wraps or bags should never be placed in an oven because they will melt.

Finishes: There are two methods of finishing the surface of materials. They are (1) Applied and (2) Mechanical depending on the corrosive properties of the base metal.

Applied finishes: Metal surfaces are often finished or coated to give a more attractive appearance, to protect the metal from corrosion or to improve, its effectiveness for certain uses. The coating maye metallic such as chromium, tin, or zinc, non-metallic such as porcelain or synthetic enamel. / The metallic finishes are applied by electrolytic deposition or dipping in molten, metal, non-metallic ones are by dipping or spraying.

Nickel is often alloyed with chromium to make wire; and with steel and chromium to produce stainless steel. Nickel alloyed with copper is called Monel metal is used for sinks and counter tops.

Chromium has an attractive silvery color and is kept in good condition simply by wiping little with a damp cloth and polishing with a dry one. Chromium plated handles and trims are used on ranges, refrigerators.

Tin: This is also used in the manufacturing of utensils, but it is used as a protective covering for metals.

Galvanized ware (zinc): Galvanizing is a process of coating a base metal with zinc in order, to protect it from rusting. Common base metals are iron and steel. It was mostly adopted to flatware and utensils in which the strains are slight, and used for pails, wash boards, lids for fruit jars and other articles that come into contact with moisture. Zinc coated material is known as galvanized iron or steel.

Non -Metallic applied finishes: Porcelain enamel, synthetic enamel, Teflon, and polyamides are non-metallic finishes which are frequently used in household equipment.

Porcelain Enamel: It is a glass like substance in organic in nature, which is fused to the surface of metal. It has smooth, hard surface which is easy to clean. It has greater resistance to temperature, food acids and alkalis. Titanium porcelain is particularly stain resistant and has a high degree of capacity. Porcelain enamel is used in every home range, refrigerator food liners and crisper pans, washers (including tops, tubs, and some cabinets) dryer tops and tubs, dish washer interiors, water heater linings, sinks, bathtubs, cookware, etc.

Synthetic Enamel: It is commonly baked enamel and is used under various trade names as the exterior finish on washers, dryers, refrigerators, freezers, and on kitchen cabinets. It is never used for the inside tub finish of washers, dryers, or refrigerator liners, cabinet doors and never for the coating on baking utensils. It will gradually wear off, at the spots where fingers frequently come into contact with it.

Paint also is a non-metallic finish. It changes color and will dip, rub off and become marred, it needs therefore frequent renewal.

Teflon: This coating is now being used for the interiors of cooking utensils. Teflon is a trademark for the non-stick Fluro carbon resin finish. It does not react chemically with food, water, or detergents. It. is applied as a coating to provide a surface so smooth that other materials will not adhere to it, making the surface easy to clean. Teflon is widely Used on inside surfaces of skillets, saucepans, baking utensils and many small electrical appliances. It is being used by some range manufacturers as a coating on even

linings range griddles and on the inside of range hoods. Spatulas, stirring spoons, measuring spoons, blades of electric and hand beater, rolling pins and other food-preparation tools have been coated with Teflon.

Polyamide: It is a synthetic material, which is chemically related to nylon. It is applied as a shiny coating on the outside but not the bottoms of cook ware. It is unaffected by detergent, food, and water.

Silicon: These are intermediate things between inorganic and organic substances. They have some of the characteristics of glass. As a finish they are used on the surface of waffle grids, baking pans and ice cube trays. A silicon permanent coating is formed which keeps food from sticking.

Mechanical Finishes: A mechanical finish is the finish of the metal itself, not something applied on the outside. It is usually a polish, made with a brushing tool or a satin type and occasionally a pebbled or hammered finish.

Polishing and Buffing: It is one type of mechanical finish. The sides of a saucepan may be highly polished for an attractive appearance and bottom is given a satin finish for better heat absorption. All baking sheets are highly polished to slow up heat absorption on the bottom of the food and to prevent over browning.

Anodizing: An electrolytic process which produces a chemical change on the surface of the metal may also be used. The oxide film is porous and absorbs color readily. Colored anodized finish is used for the colors of one line of same pans.Insulation materials:

Fiberglass is the trademark for a variety of products made of or with glass fibers. It is used in home appliances for both thermal and sound insulation.

Mineral wool is made from melted rock, slag or glass blows into fibers by steam air blast eg., refrigerator, geysers etc.

Mica is an essential part of igneous rock and is widely used as an electrical insulation.

Plastic foams like polystyrene and urethane foam are used in appliance construction, mattresses, insulated clothing and packing material.

Factors to be considered while selecting kitchen utensils

- Size of the family,
- Kind and amount of food cooked,
- Methods of cooking,
- Storage space available,
- Multipurpose usage,
- Durability and safety of utensil,
- Weight, and price of utensil.

While choosing household equipment i.e., both electrical and non-electrical the following factors needed to be considered are as follows:

Retail price, trademarks, trade names, appliance servicing, warranty and guarantee, construction and size, style, model, trim, finish, and color, performance, resources available to family, saving of time and energy, ease of cleaning, mobility, and name plate.

Care, choice, and use of electrical appliances

1. Choose the appliance of suitable size and purpose according to the requirement.
2. Information is always given with every appliance stating the voltage or its wattage or the amount of current it takes. Always follow the instructions carefully.
3. Never use an appliance once higher voltage outside the range for which it is made nor too low a voltage.
4. All appliances must be properly earthed.
5. Never adjust the appliance when the current is on. It is safe to turn off the main switch near the motor and do the needed repair.
6. Avoid handling electrical appliances with damp hands.
7. The wires, cords should be properly insulated and should be shock proof.

Pressure Cooker: Pressure cooker is made of Aluminum or steel. It works on the principle of as pressure increases temperature also increases.

1. The amount of water should not be too little or too much.
2. Check the rubber gasket periodically for cuts and cracks.
3. Check the steam outlet after every use.
4. Check the weight valve and safety valve periodically.
5. Use perforated base plate to prevent direct contact between the inner base and vessels.
6. Clean with warm, soapy water immediately after use.
7. After the use, gasket should be kept in cold water.

Iron Box: Irons can be non-electric made of cast iron or steel while an electric one has steel body and sometimes it has Teflon coating at the base. In electric there are several types like non-automatic, automatic, dry, wet and spray irons. Heating element is a bimetal blade to warp and when the heat is removed, the blade returns to its normal position. Usually, sole plate and heel rest are made of aluminum, stainless/ steel, cast iron, stainless steel with chromium or Teflon coat, and the handle and temperature control knobs made of bake lite.

Always connect the iron to adequate wiring. Prevent damage to sole plate. Do not over heat. Donot use scratching abrasives. One should be careful when ironing around zippers and pins. Avoid tipping iron when it is on. To avoid scratching the sole plate, do not iron over hooks and zippers. An iron should be kept clean, the sole plate free from rough places, stains, and rust.

Cooking range: Heat in an electric range is created when electric current flows through surface or oven resistance elements, is used to cook foods. A nichrome wire which resists the flow of electricity and thus produces heat. In the electric range the source of heat is called as a surface unit and is controlled by a switch. Surface units are of the tubular type. It consists basically of a tube made of a nichrome-chromium-iron alloy. Electric and gas ranges have many construction features in common. The frames are usually made of steel with the panels welded together.

Most of the outside sections of a range and the oven lining are finished in porcelain enamel while synthetic enamel may be used on the back panel. Never use hard abrasives for cleaning. If soap and water are not effective, use baking soda. Since milk tends to etch the enamel if spilled on it, should be wiped off immediately. The entire surface of the range, after the cooking is over, can be wiped off with a cloth dipped in warm soapy water, then with one wrung from clear water and dried.

Gas stove should be cleaned periodically. The gas regulator on the cylinder should be turned off when not using. The drip trays and burner should be removed. The stove should be first wiped with wastepaper to remove grease and then cleaned with warm, soapy water, while washing from the top-down wards no stain should be left. The rubber tube should also be cleaned with soapy water. Bubbles which indicate leaks in the tube must be carefully looked for. The tube itself may need replacement every six months or so. To avoid risk of leakage of gas it is better to consult the dealer.

The burners should be occasionally boiled in a strong soap solution to remove any dirt clogging the holes. After rinsing, all parts should be drained well and dried in the sun. This also helps in removing moisture trapped inside the parts. After rejoining the parts of the gas stove, you should ensure that all connections are tight before reneging. Any leakage between the rubber tube and the burner inlet can be easily plugged using a little Vaseline or grease. While cooking, see that the contents being cooked do not overflow and fall on the burner which can lead to extinguishing of the flame and blocking of bumer parts. The cylinder should not be tilted horizontally while in use. While lighting the burner keep the operating knob of the stove at 'OFF' position. First open the regulating valve provided on the cylinder, light the matchstick over a burner part and then turn the knob to 'ON' position.

Refrigerator: Refrigerator is a chamber in which food or other perishable products are kept at a lower temperature to decay the growth of bacteria. The frame of the refrigerator is made of sheet metal with porcelain enamel as the finish. Linings are usually iron or steel base with rock wool, spun glass, or fiber glass used as insulating materials.

Defrosting of evaporator is an important part in keeping the refrigerator in its most efficient way. The frost that accumulates acts in reducing the cooling effect in refrigerator. In models, which do not have the automatic deposit features, the following procedure should be adopted for defrosting.

1. Turn the temperature control knob to OFF position.
2. Remove frozen foods from the frozen food chest wrap in several layers of newspaper and place in the main provision compartment of the refrigerator.
3. Remove the contents from the chill tray which will then act as a receptacle for the defrost water.
4. Pull the chill tray out and open the chill deflector outwards and let it rest on to the rear position of the chill tray.
5. After defrosting is completed, clean and wipe the frozen foods chest dry.

I. Never try to hasten the defrosting process by striking at or dripping off the ice. Such treatment will damage the frozen foods chest.

II. Never use harsh, gritty abrasive cleaners as they will scratch and damage the smooth finish of the high impact polystyrene. Do not use any strong alkaline solutions.

III. Don't allow the frost to form on your freezer chest beyond 5 days.

IV. Cleaning should be done at regular intervals

Mixer / Food Processor: Foodprocessor performs various activities like grinding, mixing, chopping, creaming, and pureeing. In this electrical energy is converted into mechanical energy by vigorous rotation of blades, the desired work is performed. It is operated by the motor. Each mixer consists of a base with motor and controls, and a glass or plastic container with blades. The container fits into a well-balanced base. The base may be made up of bake lite or aluminum. The container has a polycarbonate dome shaped cover with a glass stopper. The blades are of four kinds- dry grinding, wet grinding, curd whipping, and meat mincing/vegetable grating blades. The blades are made up of steel and rust proof. For tight fitting of the cover on to the jar, a rubber ring/gasket is provided.

While using the food processor certain precautions need to be taken. Place the mixer at a convenient height so that operation is easy. Keep mixer away from direct heat or sun. In dry grinding, friction may heat up the jar, so do not worry. Ensure that dome/grinding cup clips are securely clamped before running the mixer. Hold down the dome / grinding cup lightly while mixer is in operation. Avoid using hand for filling or cleaning out jars. It is more hygienic to use the spatula or a spoon. Cut all kinds of fruits and vegetables, cooked meat, fish, and fruits into small pieces. Use rubber spatula when blending. Always remember to put the lid back on jar during operation. Follow instructions carefully regarding the different blades' assembly.

Microwave oven: Microwaves penetrate into the food, setting the food molecules in motion, an action that generates heat within the food and brings about cooking results. The process is very rapid. Microwaves may be reflected by a metal i.e., stainless steel, transmitted or absorbed. Glass, ceramics, paper, plastics transmit microwaves , commonly used for food containers in electronic cookery. The generator that produces the waves is a magnetron tube. Several small dishes in place of one large one give more uniform heating. Many foods cook uniformly without the use of additional water. Use shallow pans rather than deep ones, small pans rather than large ones, round rather than square or rectangular pans.

Washing machine: Washing machines' tubs are made of porcelain , enamel, aluminum, stainless steel, and nickel-chromium. Washing machines are of three types- non automatic, semi-automatic and fully automatic.

1. Cost and durability of a machine should be considered.

2. The availability of service, parts, repairs should be considered before buying the machine.

3. Before buying a machine ask for demonstration, learn how to operate controls.

4. The framework of washing machine must be of good steel, should be of reputed brand.

5. Washing machine must be easy to move, so that it can be used near a sink or near a floor drain.

6. The machine must be well installed. The switch for controlling the meter and levers for the washing machine of the tub and

7. Drying device should be at convenient working height.

8. The convenient height of washing machine is 3' from the ground level.

9. Washing efficiency of a machine depends on the design , quality , amount of soap used, temperature of the water, the type of clothing, , the time the machine is operated for the load.

IN TEXT QUESTIONS

I. Short answer questions

1. List down the factors to be considered while selecting kitchen utensils.

2. Mention the care, choice, and use of electrical appliances.

II. Long answer questions

1. Enlist and describe about various materials used for kitchen utensils and equipment.

2. Explain about the finishings for kitchen utensils and equipment.

III. Activity

How will you suggest selection and care of refrigerator.

UNIT - 24

SPACE MANAGEMENT

Space management is the process of controlling and managing space with proper planning and designing. Managing the space with planning will help to ensure the utilization of the floor space without wasting it and will increase the functionality of the space

Importance of space management

- Space for family living must be within the capabilities of people who live in it.
- A house plan is a must for building a home before its construction begins.
- When making a house plan, it is necessary to consider the location, lifestyle, family size, environment, and budget as well as space maximization, building materials, aesthetics, and government laws.
- The basic house plan elements should comprise of the main elements that a homeowner would like to see in their home.

Types of spaces: There are three types of spaces in residential interiors.

a) **Public space:** It is an open and accessible space to all the members without any time restriction. It includes living cum dining room, drawing room and verandahs.

b) **Private space:** It is a place where one can keep things as they like for example in bedrooms and dressing rooms. It gives the people safety and comfort.

c) **Utility space:** Kitchen and laundry rooms are utility spaces where one or two members will be working for the entire family's needs.

Tips to manage space in various rooms

i. **Dining room:** If kitchen is scientifically planned, even a verandah on the rear side closed with a dwarf wall 3` high & trellis work above serve the purpose of Dining Room. If it is a separate dining room

- Should be located as near the kitchen as possible to save unnecessary walking
- Provision of one or two cupboards with a display unit for crockery and heat resistant top that would aid while serving and
- A wash basin in a corner for washing hands is great convenience.

If dining is done in an orthodox manner while squatting on the floor, a minimum width of 8` is required for two rows of diners facing each other, with adequate gateway between for the server.

ii. Kitchen: Kitchen space is divided for performing different works. The three main work centers within a kitchen are food preparation, sink and cooking. Storage space should be provided near to the sink for buckets and washing up bowls and detergents. A rack should be provided for hand towels and drying up clothes.

iii. Living room: The arrangement of furniture should be flexible due to the large number of activities taking place there. The minimum size for a drawing room should be 15ft * 12ft. There must be sufficient unbroken wall surface for arrangement of furniture.

- Separate spaces should be allocated for different functions and groups. Eg. For entertaining guests, TV watching
- Suitable furniture should be arranged accordingly.
- If the room is very large, group games like Indoor play like Carroms, Chess areas can be arranged
- Writing area with a desk and one or two office chairs.
- In Indian homes, drawing room is best situated on one side of the house with an entrance from the front verandah.

iv. Bedroom

An oblong room is more convenient particularly as a bedroom, than a square one. No bedroom should be less than 100sqft in floor area. Bedrooms should be placed on the side of the direction of the prevailing wind and if this happens to be west, the wall on that side should be protected from being heated by the sun's afternoon rays by the provision of a deep verandah on that side.

- The ideal conditions are that the sun should shine in the bedrooms for some part of the day, preferably in the morning, and free breeze should ventilate it by night.
- A small bathroom combined with a dressing room attached to bedroom is more or less a modern necessity in the houses of the well-to-do.
- Some storage space is essential in bedrooms. Portable storage shelf or almirah not only occupy some floor space, and the cubic contents of the room, but it has got a top surface which collects dust. Besides it is difficult to keep the cramped space below the wardrobe clean.
- A cupboard built into wall is free from all these disadvantages besides being cheaper. One or two such built - in cupboards in the places where they would not come in the way of beds are very convenient. A chest of drawers also could be provided built into the wall below such cupboards.

- While planning bedrooms first determine the position of the bed in respect to the windows, so that the bed would be in the path of the cross-air currents. At the most another position for bed may be thought for winter, away from direct breeze.
- Door should be located in a way that when open, the bed would be screened rather than exposed.
- A Single - leafed door is thus more suitable in bedrooms.
- Further, there should be adequate space for the bedroom furniture such as a chair, dresser, small table etc.
- Master bedrooms should be spacious enough to accommodate a double bed or twin beds with adequate circulation space and if possible, it should have its own bath- room.

Storeroom

- Storeroom should be well lighted and ventilated and there should be row of shelves all round. The lowest row should be at least 9" above the floor level. So that the floor could be easily cleaned & washed. For an ordinary family a storeroom of 10` × 6` should be adequate.
- In rural districts a bigger storeroom is required to store staple food-grains – during the harvest season. An efficient home must have not only a place for everything but also everything in its own place.
- Traditional Type – provided a very large space, a big hold-all-in basement floor, attic, and cellar.

- **Loft:** A loft can be constructed on the top of the garage at a height of 7' above the floor level. Lofts can also be built at a height of 7` above bathrooms & W.C and passage.

Relationship between space and aesthetics

a. Arrangement of furniture: In planning the arrangement of furniture for rooms, one must plan places to sit for reading, conversation and relaxing, a place to sleep, a place to eat and places in which to put things.

Furniture should be arranged a) for convenience of use and 2) for beauty. Convenience means placing the furniture pieces where they are most related and allowing space for traffic lanes.

Furniture needs proper or places assigned according to use. Eg: a sofa group would be the center of interest in the room.

Leave enough space in front of furniture pieces: eg; 2' in front of a chair, 3' around a dining table, 18" for dining chairs (in addition to the width of the chairs), 18" for serving in back of dining chairs, 2' at the end of the bed and at each side of the bed, if there is a chest of drawers, there must be sufficient space in front of the drawers in order to open and use them.

A feeling of space is gained by putting furniture against the wall rather than having it stand out free with the back in the room.

b. Arrangement of accessories: If there are too many accessories, a room becomes cluttered and disorderly in appearance. If a family has large collection of accessories, use a few and make changes occasionally to add interest to each room.

Some of the general principles to be followed in placement of accessories are as follows:

- Accessories should be placed with suitable background.
- Accessories in a room should show variation, for it would be monotonous if they are all made of the same type of material.
- The size, shape, color, theme, texture, and purpose of an accessory should blend harmoniously with the color scheme with the overall established arrangements in that particular room.
- If the room furnishings are primarily of one period (traditional/contemporary, modern etc.), the accessories should be of the same period or be in harmony with it.
- One of the important rules to follow in order to give the accessories their proper setting is to mix formal with formal and informal with informal. In all, accessories should meet the basic requirements of harmony.

c. Arrangement of flower arrangement:

- Flower arrangement is the art of organizing flowers, other plant materials, receptacles, and accessories into ensembles to have beauty of form, color, texture, shape.

  Consider the personality of family/ individual/ group, occasion, resources, background / placement area (screen, table, floor etc.) while arranging flowers.

IN TEXT QUESTIONS

I. Short answer questions

1. Mention types of accessories used in interiors
2. Differentiate between public and private spaces in residences.

II. Long answer questions

1. How do you arrange space in living and dining areas in houses?
2. Mention the tips in arranging furniture.

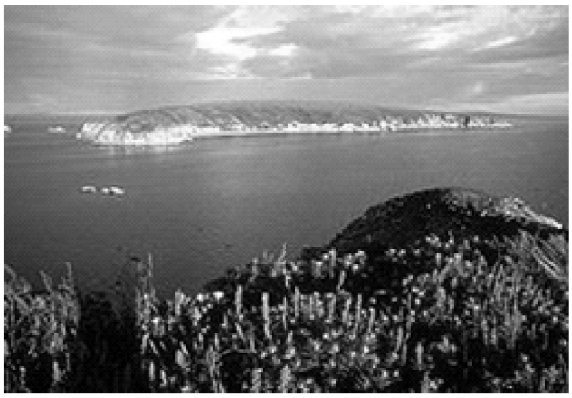
III. Activity:

1. Describe the furniture arrangement done in your living room and bedroom.
2. Mention the types of accessories used in your house.

UNIT - 25

ENVIRONMENT MANAGEMENT

Environment is defined as the complex of physical, chemical, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival. Natural changes occur over a period of time while man-made changes are mainly due to the scientific and technological development based human activities.

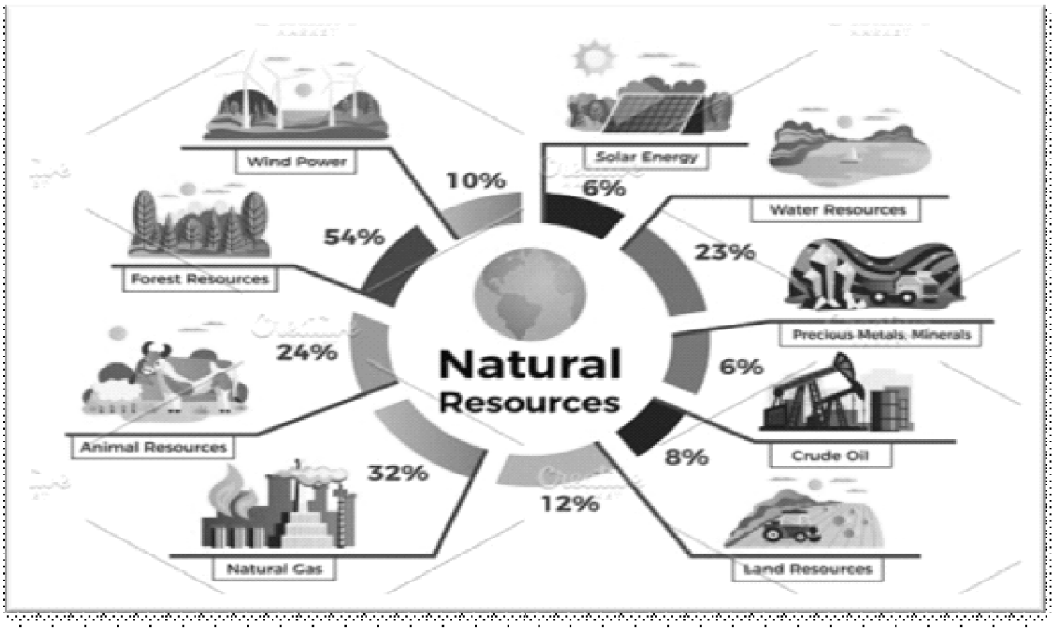


Importance of Environmental Studies

The environment studies make us aware about the importance of protection and conservation of our mother earth and about the destruction due to the release of pollution into the environment. The increase in human and animal population, industries and other issues make the survival cumbersome. A great number of environment issues have grown in size and make the system more complex day by day, threatening the survival of mankind on earth.

Environmental protection is very important from three perspectives i.e. productive value, aesthetic value and option value.

Types of Environmental Resources



Resource refers to all the materials available in our environment which help us to satisfy our needs and wants. Natural resources are resources that exists in nature without the actions of humankind.

1. Sunlight
2. Atmosphere
3. Water
4. Land
5. Air
6. Minerals
7. Vegetation
8. Animal life

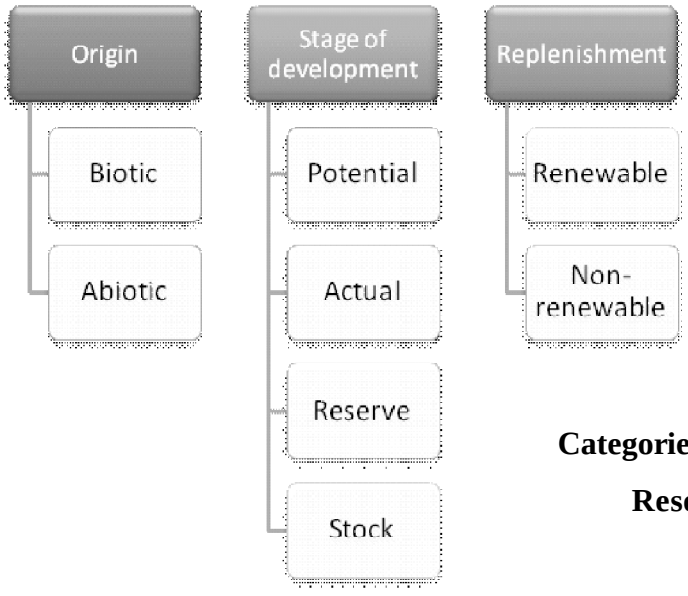
Categories of natural resources

The natural resources are classified into three categories based on their origin, stage of development and replenishment.

I. Based on Origin

a. Biotic — These resources are obtained from the biosphere (living and organic material). Fossil fuels such as coal and petroleum are also included in this category because they are formed from decayed organic matter.

b. Abiotic – These resources come from non-living/ non-organic material. Examples of abiotic resources include land, fresh water, air and heavy metals including ores such as gold, iron, copper, silver, etc.



Categories of Natural Resources

II. Based on the Stage of Development

a. Potential resources — They exist in a region and may be used in the future. For example, petroleum occurs with sedimentary rocks in various regions, but until the time it is actually drilled out and put into use, it remains potential.

b. Actual resources — They have been surveyed, their quantity and quality determined and are being used in present times. The development of an actual resource, such as wood processing depends upon the technology available and the cost involved.

c. Reserve resources — The part of an actual resource which can be developed profitably in the future is called a reserve resource.

d. Stock resources — These have been surveyed but cannot be used by organisms due to lack of technology. For example: hydrogen

III. Based on the Replenishment

a. Renewable Resources — These can be replenished naturally. For example: sunlight, air, wind, water, etc., are continuously available and their quantity is not noticeably affected by human consumption. Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use. Resources from a human use perspective are classified as renewable only so long as the rate of replenishment/ recovery exceeds the rate of consumption.

b. Non-renewable Resources – They either form slowly or do not naturally form in the environment. Minerals are the most common resource included in this category. Some resources naturally deplete without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them, but coal and petroleum cannot be recycled.

Environmental Issues:

a. Deforestation: With the increase in population, more and more forests are being cut to provide accommodation and other amenities to people. This has led to an increase in the amount of carbon di-oxide in the atmosphere. Add to this, burning of forests, for the purpose of deforestation, and we know why the carbon di-oxide has increased to such enormous levels. Some of the other causes of deforestation are clearing forests for oil and mining exploitation; to make high ways and roads; slash and burn forming techniques; wild fires; and acid rain.

b. Environmental pollution is defined as an undesirable change in the physical, chemical, and biological characteristics of any component of the environment (water, soil, air) that can cause harmful effect on various forms of life and property.

Pollutants include solid, liquid, or gaseous substances present in greater than natural abundance, produced due to human activity, which have a detrimental effect on our environment.

TYPES OF POLLUTION ARE:

- ♦ Air pollution
- ♦ Water pollution
- ♦ Soil pollution
- ♦ Noise pollution
- ♦ Vehicular pollution
- ♦ Marine pollution
- ♦ Nuclear pollution
- ♦ Thermal pollution

c. Climate Change: Average long-term weather of an area is called 'climate'. Climate is determined by temperature and preparation. Changes in climate can be defined by the differences between average conditions at two separate times. Acid rain, ozone layer depletion, and green house effect are the issues being faced due to change in climate. These changes are harming environment and human health.

d. Disaster: Disaster is a situation arising from natural forces where large-scale disruption of infrastructure, services occur, causing a serious impact on human life, economy and environment. Disaster is also defined as a sudden calamity producing great material damage, human loss and distress. Disasters include cyclones, drought, earthquakes, floods etc.

Impact of disasters

- Disasters cause many deaths and economic losses amounting to billions of dollars each year.
- Disasters kill many people, inflict injuries, and facilitate the spread of diseases and displace over billions of people.
- Mainly poor people face unforeseen hardships, misery, and death.
- Development programmes will be disrupted accompanied by destructions of strategic infrastructure.
- Flood waters provide an ideal breeding ground for mosquitoes and create an increased risk of such diseases as malaria, dengue, and rift valley fever.
- Flood water combined with effects of open sewage leads to cholera, diarrhoea and gastro-intestinal viruses, leptospirosis and hanta virus infection.
- Drought triggers malnutrition and famine.
- Droughts also led to migration, damage to public health, infrastructure, water distribution and health care.

Conservation of resources:

Individuals are responsible for conservation of resources:

1. Develop respect for all forms of life.
2. Plant trees on a regular basis.
3. Reduce the use of wood and paper products, recycle paper products and buy recycled paper products.
4. Restore a degraded area of forest.
5. Refuse to buy furs, ivory products, items made of reptile skins, tortoise shell jewellery etc.
6. When building a house, save all the trees.
7. Don't buy furniture made from teak and mahogany.
8. Advocate organic farming.
9. Use pesticides in small amounts (if necessary).
10. Set up a compost bin and use it to produce soil conditioner for yard and garden plants.

INTEXT QUESTIONS:

I. Short answer questions

1. What are the types of environmental resources based on replenishment?
2. Mention the types of pollution.

II. Long answer Questions:

1. How to conserve the resources at individual level?
2. What is the impact of disasters on human beings?

MODULE VI
ECONOMICS AND CONSUMER EDUCATION

UNIT - 26

ECONOMIC &, CONSUMER EDUCATION & MONEY MANAGEMENT

Economics mainly deals with production and consumption of wealth.While consumer education deals with creating awareness among consumers about their rights and responsibilities in order to protect them from malpractices followed by the producers and sellers. By studying this module on economics and consumer education, students will be able to:

1. Learn the importance of money management, types of income and steps in budget making
2. Understand the problems faced by consumers in the market.
3. Gain knowledge in protecting consumers from malpractices by exercising their rights
4. Study the standardization marks used for different products

I. Family Income:

- Family income is the stream of money, goods, services and satisfactions that come under the control of the family, to be used by them to satisfy needs and desires and discharge obligations.
- Family Income can be defined as money /purchasing power earned by family members during specified period of time plus goods and services received or created in that time by the family-goods like vegetables from kitchen gardens, services like teaching children , doing household chores etc (Varghese et al).
- According to Nickel and Dorsy "Family income is that stream of money, goods services and satisfaction that comes under the control of the family to be used by them to satisfy the needs and desires and to discharge obligations/family duties.

Types of Family Income

A. Direct Income

B. Indirect income

A. **Direct Income:** Direct income is the income which is in the form of direct money. It includes the income earned by members of family and it can be in the form of salary or earned through business. Apart from this some people have immovable property like house, shop and land. They can get rent out of this. Money in the bank earns interest. So the money from all above sources comes under direct income.

B. **Indirect income:** This is the income that the family gets in the form of facilities which if not provided then family has to spend from their own earnings. E g: Rent free accommodation, free medical facilities free education, free transport facilities and other rebates on the items consumed daily.

Major Types of Family Income

a) Money income

b) Real income

c) Psychic income

a. Money income: Money income includes all the income received in the form of money or cash in terms of rupees (currency, coins , bank drafts or cheques in the particular currency of the country) Viz wages or salary , pensions, rents, gifts, interests earned from bank deposits, other investments, insurance claims and bonuses etc

Money performs important functions like

- It is the very good medium of exchange
- It measures the value or the worth of the commodity or services
- It serves as a yard stick to measure the standard of living of any family in society.

b. Real income: Real income is defined as the flow of goods and services used or available to family for any given period (according to Gross and Crandall).

- Families receive real income. It comprises of goods and services which family enjoys over a given period of time. A house for example contributes to one's enjoyment although it is not accounted for in the money income. The real values in income received are the goods and services and security and well being that income (money) will purchase. Real income consists of both producers' goods such as machinery, raw material, factory etc.
- It also includes consumer goods such as fruits and vegetables etc. Both these types of goods have wants and power of satisfaction.
- Real income is important for family's living .If part of the house is closed off or when a washing machine is not used regularly the potential services of these items are not fully realized. Hence real income of a family depends upon the clever use of all items possessed by them.

c. Psychic Income: Psychic income can also be called enjoyment income.

- Psychic income consists of satisfaction derived by persons from the use of their real income. This type of income is purely subjective and intangible. The quantity of psychic income depends on the skill that is exercised in managing their everyday living. If a person manages his resources better than his neighbour he will have better satisfaction and hence his psychic income is more. Similarly in case of two families having similar size, income, living and environment conditions, one of them may enjoy higher psychic income by managing their resources better than the other.

d. Total income of a family consists of Money income, Real income, and Psychic income.

In addition to the above three components of total income there is an additional form of income which has not been turned into economic goods. This additional money income may be assigned to three different uses i.e.,

- Payment of taxes
- Savings for the future or

- Gifts to persons outside the family.

Money income of a family is limited. Hence it is necessary to spend the available income in a planned way.

A budget is a carefully thought-out plan of spending the money available for the required period of time.

Family budget is an estimate of future income and expenditure of the family for a given period of time.

Definition of budget: Family Budget is an Estimation of income over a period /Planning of Expenditure /Planning for saving. Family budget is a record of past expenditures, an estimate of future expenditures and distribution of current expenses on various items over a certain period of time. The family budget can be for a week, month or year depending on the size of income and expenditure of the family.

Steps in Making Budget: There are five steps in making Budget

List commodities and services needed and wanted by family members as given below:

- **Food:** Food at home and Food away from home- groceries, dairy products, vegetables, fruits, spices etc. money spent on cooking and serving of meals, money spent on fuel, maintenance costs of all equipment and gadgets used for preparing meals, food eaten outside, cost of the food served to family guests or on social gatherings, salary paid to the servant.
- **Household Operations:** Rent and Repairs, house tax, property tax etc, cost of furnishings and decorating the house, wages of cleaning woman, cleaning agents, brooms, brushes, dust bins, door mats, curtains, electric charges, water rates, telephone charges etc.
- **Transport:** Petrol, Diesel, Bus fare, Train fare, Air fare, Rickshaw fare,
- **Services of Maid/servant, Cook, Dhobi, Tailor, Cobbler, Electrician, Beautician**
- **Reading and Recreation:** Movies, Picnics, concerts, Magazines/books, Tapes – audio – video, Vacation trips, News paper, cost of general books, news papers, magazines bought by the family, going to cinemas, plays, dances and such other shows where the entry is by tickets, going to hill stations, use of radio, TV, radiogram, tape recorder, being members of recreational as well as service clubs, playing cards, billiards, golf, tennis, badminton and other indoor as well as outdoor games by members of the family.
- **Clothing:** Outer garments, Inner garments, Accessories, seasonal clothing, sewing charges of clothes, money spent on washing and repairing of clothes, dry cleaning charges, cost of boxes for storing clothes in various seasons, shoes, hats, purses, walking-sticks, rain coats, umbrellas etc.
- **Furnishings:** Furniture, Equipment, Draperies, bed linens, Towels, Sofa covers, table covers etc.
- **Medical care:** Doctors fees and Medicines, medical check-ups, fees of doctors, dentists, hospital charges, special diets required for sick members of the family tonics recommended by the doctors, various types of soaps, shampoos, oils used by the family members, cost of reading glasses, ear phones etc.
- **Personal:** Cosmetics, Jewellery, Tobacco, Liquor
- **Communication:** Telephones, Telegrams, phonograms, Inland letters, Envelopes, Greeting cards

- **Education:** Stationery, School/college fees, Hostel fees, expenditure on books, notebooks, stationery, school and college fees, transport charges including the fare for the school bus, uniforms worn by the children, university examination fees and fee for the private coaching, money paid for educational trips
    - **Religion:** Donation to temple/church/masjid
    - **Utilities:** Fuel, Electricity, Water
    - **Miscellaneous:** Money paid for charities and to handicapped people, social or religious institutions, telephone expenses, cost of trips to hill stations may also be included.

The expenses would be varied depending upon the income, age of the family members, education, socio-economic status, size of the town, standard of living of the community to which the family belongs etc.

Under each heading a relative importance of items should be established by either a) listing the items in order of decreasing importance or b) by grouping them under "essential" and "nice, but not necessary".

- Set aside for future long-term goals such as the development of human capital and possible emergencies.
- Set aside for this year's fixed commitments and large irregular expenses.
- Set aside for past-due bills and debts.
- Keep aside for regular monthly and weekly needs such as food, automobile up keep, personal allowances and household supplies.
- Miscellaneous including reading, entertainment, overlooked items and small emergencies.

Estimate the cost of desired items, total each classification, and estimate the total for the budget. Past records are helpful in this connection (bills, cheques, receipts etc. and prices of commodities from shops should be found). Do not underestimate.

Estimate and total the expected income from all sources for the period in question. List 'assured' and 'possible' income separately. All sources of current income should be considered. They include wages, salaries, social security benefits or pensions, interest on savings accounts or bonds, dividends from stocks, rent and other variable sources. Funds from all sources of current income should be totalled to give the amount available for the budget period. Using credit makes future income available for current expenditures.

Set aside a definite sum as emergency fund as well as for goal-oriented savings and insurance.

Bring expected income and expenditure in balance. Balancing of budget can be done in two ways:

- Increase the income by part time job, overtime, household production.
- Cut down the expenditure by –
    a. Cut down eating outside
    b. Do not waste food

c. Check extra expenditure on light by saving i.e. Close the lights when not needed.

d. Ironing and washing at home

e. Stitching clothes at home

f. Economic use of paper, pencil

g. Prefer bus or cycle instead of a rickshaw

h. Use of public library instead of buying story books

i. Shop wisely at cheaper rates after finding information

j. Shop in one trip, avoid impulsive buying.

k. Shop around and find out goods of low price with good quality.

l. Cut the items which are nice but not necessary.

m. Acquire goods directly without use of money.

n. Carry lunch from home instead of eating in factory.

Check plan to see if it is realistic at all points. A good budget characterized by the following points:

i. The estimates of income should be good. Remember that the gross income of the family differs from its take home pay.

ii. The expenditure estimate should be as accurate as possible. You should have figures of expenditure in a similar period in the past.

iii. The allocation of the resources on expenditure side should be reasonably accurate, the family must be able to determine its needs and wants as they are now and as they can arise (eg. Budgeting for July month will need extra outlay on school fees, uniform, shoes etc.

iv. The budget is flexible by allowing sufficient margin on certain items.

Keeping records is an important aid in successful money management. It is possible to make use of the details of records of expenditure in various ways.

Types of accounting systems

- Sheet method
- Envelope method
- Notebook method
- Card filing method

Sheet method: Records of expenditure may be kept on loose sheets hung along with a pencil at a convenient place. The place should be accessible at all times and the pencil should be kept tied so that it cannot be removed. Otherwise there will be the tendency to think, "I'll put it down later on" with the result that one might forget and there will be inaccuracies in the record and the record keeping habit

also will be taken. In case of a single sheet there will not be adequate space for keeping the different classes of expenditure separate, eg. Vegetable, cereals and pulses, milk, etc. In such a case at the end of the month the homemaker will have to sit down and make entries in a separate notebook in order to have a clear picture of the income and expenditure during the month.

It is convenient to use since the sheet can be tacked on the back of the board, the end of a cabinet / back of a door hung along with pencil. This method is simple and flexible.

Envelope method: Two types of envelope systems are possible here they are

- Cash payment method and

- Pure sheet accounting system

In cash payment system money is divided into previously planned amounts and Money for each group. It is placed in separate envelop to be dispersed with as and when the need arise (e g: food, housing etc). Total money and expenditure can be specified on the cover. This system could be used by people who receive their weekly wages and who operate mostly on a cash method of payment.

Advantages

1. This system brings planning and accounting close together.
2. For people whose resources are meagre the system is direct and simple, highly flexible, adequate and convenient if money for change is anticipated and supplied.

Drawbacks:

1. For families working with higher sums, it may be unsafe to have much money laying in envelopes, even if it is under lock and key.
2. Keeping such large amount in cash might prove inconvenient. Cheque payments are definitely more convenient and safer from all points of view where large amounts are involved.

The second envelope method is just keeping a large envelope where all bills, vouchers, memoranda etc. are thrown in and on the outside an entry is made of the income and expenditure. Two envelopes may be used, one for the bills and another for the cash.

Advantages

1. It is entirely flexible and simple.
2. If the envelope is not very big, a sheet of paper can be put inside for recording.
3. In the end, the homemaker will have to put in several hours of work sorting out the bills and writing down the various items. Further, if any bill is lost then there will be nothing to show that an item of expenditure has been missed.

Notebook method: Household accounts may be kept either a bound or loose –leaf note books. Loose –leaf book is very convenient, and it has the advantage of being more flexible because new pages can be added and old ones replaced whenever necessary. And if any age has been used wrongly it can be

removed. If this type of book is used, one with metal strip fasteners will be found to be more durable than the ring type. The spiral notebook is a type of bound book.

Card file account system: This is highly flexible method, since card can be kept for each type of expenditure. It can be adequate, but it may not be simple or convenient for a person not highly conscious of organization. If children are to aid in accounting the card file is inadvisable because of the possibility of mixing cards or even scattering them. It is convenient when one individual is in charge of all the accounts. But this might be useful for families which are also doing business and where household accounts are important also from the tax point of view.

Savings is an important requirement of the family's income. Savings is defined as accumulating a part of present income for future use.

Investing funds is the process of placing them in a more or less permanent form, with the expectations of assuring the security of the principle and of receiving a regular and predictable return on the principle. This return is the income yield from the investment.

The motivation for saving and investment may be for the following reasons:

- Desire for a specific commodity in the future
- Desire for some future accomplishment
- Fear of future impoverishment/old age security
- Meeting emergencies and unforeseen needs
- Maintaining standard of living in changing economic situations

Institutions of family savings include:

- Post office
- Banks
- Unit Trust of India
- Life Insurance Corporation
- General Insurance
- Shares and Debentures
- Chit Funds
- Provident Fund
- Gold, House and Land (Real estate)

Ways of Supplementing Income

1) Increase the supply of real income in terms of goods i.e. by growing vegetables and fruits at home; in terms of services i.e. by doing household work, marketing work and repairing work by family members

2) Taking part time job during free time i.e. saree falls stitching, blouse stitching, typing work etc. and also doing online work if computer skills are there by posting cooking related videos, conducting online yoga classes, dance/music classes etc.

3) Starting small scale enterprises at home i.e. running a boutique & beauty parlours, pickle making, snack making, roti making, batter making etc.

INTEXT QUESTIONS:

I Short answer questions

1. What are the types of income?
2. Mention the account keeping methods.

II Long answer questions

1. Explain the steps in budget making.
2. Differentiate between savings and investment and need for the same.

III Activity

Ask your mother/father and describe the account keeping method, saving institute, items of expenditure incurred at home.

UNIT - 27

CONSUMER PROBLEMS

Consumer is an Individual who buys products or services for personal use and not for manufacture or resale.

Or

A consumer is someone who can make the decision whether to purchase an item at the store, and someone who can be influenced by marketing and advertisements.

A consumer is a person who consumes goods, services and gift of nature for his/her satisfaction and general well being.

A consumer faces many problems ranging from variation in prices to malpractices followed by the shopkeepers.

Variation in Prices: Consumer problems regarding variation of prices are making for higher profit, Covering up for all maintenance expenditure as well as advertisement and sales promotional costs by prestigious departmental store, incurring high operational costs due to computers and air-conditioning of shops, Free home delivery costs are being met by consumer. High cost of materials in sophisticated shopping complex close to affluent residential areas, consumers paying high prices for goods which are not easily available due to lack of demand, shortage of production, late deliveries, seasonal items etc., High cost due to the involvement of a lot of middlemen.

Adulteration: Adulteration is addition or removal of any substance from the original product to change its nature, composition, or quality. Incidental adulteration is due to the accidental mixing of products of different qualities while the intentional adulteration is always done to cheat the consumer and make more profit

Defective weights and measures: Weights may have hollow space. They may be dented, as a result they weigh less than the actual weight.

- Using stones instead of proper weights.
- Weight used may be without the stamp of weights and measures department.
- Weighing balance may not be used properly. A magnet may be stuck at the bottom of the pan or iron rings put on the string to make one side of the balance heavier than the other.
- Missing of pointer of the balance in some cases.
- Table model weighing machines may be kept on uneven surface.
- Weighing sweets along with the carton.
- Using measuring jugs that have a false bottom and raised base to cheat their customers.
- Use of faulty measuring tape depriving the consumer of the right length of material.

Hoarding of commodities: Shopkeepers hoard commodities and create artificial shortage to make more profit. During pre-budget session many shopkeepers start hoarding commodities that are liable to

cost more later. Eg. Petrol, diesel etc.

Substandard quality: Products not conforming to the laid down standards. Taking advantage of the consumers having limited consumer awareness and money. Selling substandard products by giving them attractive packaging.

Inadequate/misleading labeling: Imitations of the popular brands are so cleverly disguised that the consumer finds it difficult to differentiate between the genuine and the misleading labelingeg: lifebuoy / lifeboy. Packing poor quality products in similar size, shape, and colored labels like that of popular brand. Not revealing the appropriate directions for its use.

Customer persuasion by shopkeepers: Sellers persuade the buyers to purchase a particular item/ brand because they get a higher rate of commission on it.

False Advertisement: Advertising is a very forceful tool of persuading and influencing the consumer's judgment. Advertisement regarding chocolates, wafers, aerated drinks, juices, jeans, toothpastes, toiletries, two wheelers etc. target at the younger generation that gets easily influenced.

Duplicate Manufacture : Duplicating the popular brands is a deliberate malpractice and results in cheating the consumers. Such products are generally of cheap quality and unsafe to use.

Sale Gimmicks: Attracting consumers by giving free gifts, discount sales, extra benefits such as introductory offers etc. Exchange offers is also a very popular gimmick

Deceptive Packaging: Packaging is done to protect the product from any kind of damage like breakage, evaporation, contamination, and pilferage etc. Sellers misguide the consumers by making the volume or size of the package appear much bigger than the inside contents. Eg. Lays, kurkure etc.

Delayed and Inadequate Consumer Services: Poor maintenance of health, water, electricity, post and telegraphs. The workers connected with these services often bother the consumer by not rendering the services efficiently.

INTEXT QUESTIONS

I. Short answer question

1. Define Consumer.

II. Long answer question

1. Explain about the problems faced by consumers

III. Activity

Narrate any incident where you faced a problem while purchasing/exchanging/repairing any product.

UNIT - 28

CONSUMER RIGHTS AND RESPONSIBILITIES

Consumer Education : It is important to recognize and understand that "consumer education" means different things to different people. For instance:

- To an ordinary consumer, education is viewed as information to help him/her to make better choices of goods and services in the marketplace.
- A businessperson views consumer education as activities that assists in selling services and products.
- A bureaucrat views consumer education as a programme to complement and supplement laws and regulations that foster trade competition. They believe that healthy competition and an educated body of consumers will ensure protection for the consumers.
- A consumer advocate sees consumer education as providing information to consumers to protect them from fraudulent trade practices and exploitative market operation.
- And an educator sees consumer education as development of skills and knowledge that assist consumers to play their role effectively in the market place.

We need consumer education to build our knowledge, skills, aptitudes, values, and capacity to play the role of a responsible consumer.

Consumer Rights : The global movement has articulated 8 universal rights for consumers as follows:

Basic needs: The right to basic goods and services which guarantee survival: adequate food, clothing, shelter, health care, education, and sanitation.

Safety: The right to be protected against the marketing of goods or the provision of services that are hazardous to health and life.

Information: The right to be protected against dishonest or misleading advertising or labelling. And the right to be given the facts and information needed to make an informed choice.

Choice: The right to choose products and services at competitive prices with an assurance of satisfactory quality.

Representation: The right to express consumer interest in the making and execution of government policy.

Redress: The right to be compensated for misrepresentation, shoddy goods or unsatisfactory services.

Consumer education: The right to acquire the knowledge and skills necessary to be an informed consumer.

Healthy environment: The right to live and work in an environment which is neither threatening nor dangerous and which permits a life of dignity and well being.

Consumer Responsibilities

Consumer responsibilities refer to the responsibility of having awareness of the quality and safety of goods and services while purchasing and the responsibility to collect information available about a

product or service and to update oneself with changes or innovations taking place in the market. It means the responsibility to think as well as make choices independently and consider immediate needs and wants. It refers to responsibility to speak out, and to inform manufacturers and governments of needs and wants and the Responsibility to Complain or inform business along with other people about discontentment with a product or service in an honest way. There should be Responsibility of being an Ethical Consumer and be fair and not engage in malpractices which make all consumers pay.

Consumer education must inculcate the responsibilities of the consumer as well. Responsibilities always precede rights. If consumers want their rights recognized, they must first exercise their responsibilities. These responsibilities are:

i. **Critical Awareness:** The responsibility to be more alert and questioning about the price and quality of the goods and services we use.

ii. **Action:** The responsibility to assert ourselves and act to ensure that we get a fair deal. As long as we remain passive consumers, we will be exploited.

iii. **Social Concerns:** The responsibility to be aware of the impact of our consumption on other citizens, especially disadvantaged or powerless groups whether in the local, national or international community.

iv. **Environmental Awareness:** The responsibility to understand the environmental consequences of our consumption. We should recognise our individual and social responsibility to conserve natural resources and protect the earth for future generations.

v. **Solidarity:** The responsibility to organise together as consumers to develop the strength and influence to promote and protect our interests.

Consumer Responsibilities to be followed under Consumer Protection Act

Various efforts have been made by government and non-government organizations to protect the interest of consumer, but exploitation of consumer will stop only when consumer himself will come forward to safeguard his own interest. Consumers have to bear some responsibilities which are given below:

Consumer must Exercise his Right: Under Consumer Protection Act the consumer is granted various rights such as right to safety, right to choose, right to be heard etc. but these rights will be useful only when consumer exercises these rights. The consumer must select the product on getting full information on the quality, quantity, utility, price etc. of the goods or according to his preferences, he must file a complaint if he is not satisfied with the quality of product, he must be aware of his rights and exercise them whenever required.

Cautious Consumer: The consumer should not blindly believe on the words of seller. He must insist services.

Filing Complaints for the Redressal of Genuine Grievances: Most of the time consumer ignores the loss he suffers on purchase of defective good or service but this attitude of not filing complaint encourages the corrupt businessmen to supply low standard or defective goods and services.

The consumer must file a complaint even for a small loss. This awareness among consumers will make the sellers more conscious to supply quality product. Whenever consumer is filing a complaint, it must be genuine. The consumer should not exaggerate the loss or defects of goods.

Consumer must be Quality-Conscious: The problems of supply of substandard goods, adulterated products and duplicate products can be solved only when consumer himself stops compromising the quality of product. While purchasing the goods or services consumer must look for quality marks such as ISI mark, Agmark, ISO, Wool Mark, etc.

Do not be carried away by Advertisements: The advertisements often exaggerate the qualities or features of product or service. The consumer must compare the actual use of product with the use shown in advertisement and whenever there is any discrepancy or difference it must be brought to the notice of sponsor of advertisement and insist to stop showing exaggerated qualities.

Insist on Cash Memo: To file a complaint the consumer needs the evidence of purchase, and cash memo is the evidence or proof that consumer has paid for the goods or service. A seller is bound to give a cash memo even if buyer does not ask for it. To file a complaint and get compensation the consumer must ask for cash memo.

Form consumer societies which could play an active part in educating consumers and safeguarding their interest.

Respect the environment, avoid waste littering and contribution to pollution.

Discourage black marketing, hoarding and choose only legal goods and services.

Be aware of variety of goods and services available in market.

IN TEXT QUESTIONS

I. Short answer questions

1. List down consumer rights.

II. Long answer questions

1. Explain the consumer responsibilities to be kept in mind while making any purchase.

III. Activity

Collect information from 5 of your friends, whether they exercised any consumer rights in the past one month while purchasing any item.

UNIT - 29

STANDARDS AND STANDARDIZATION

In a country like India, consumers very often succumb to malpractices because of lack of awareness on product quality and imitations. They are unable to utilize the information in differentiating between quality products and imitations. There are several aids like quality certification marks and information labels, available for the consumers.

Standardization is the process of making something conform to a standard.

Product Safety

Product safety implies that when used does not cause injury to health or person. A number of aids are available Most important of them is certification marks certification schemes are voluntary. The producers have to get their manufacturing process, equipment and products through stringent tests of quality in authorized laboratories and then a mark or label is given.

- 'Agmark' – this is a trademark of quality control set up by the Government of India.
- It establishes the norms related to the acceptable physical and chemical characteristics in natural and processed foods.
- Agmark certification assures the consumer of correct selling practices like quality and purity of product, correct weight, and other relevant chemical and physical characteristics.

Consumer Checks :

1. AG mark on the pouch/ container for purchase of pulses, rice, wheat, flour, edible oil, ghee, butter, honey, spices etc.

2. Prevention of Food Adulteration Act – was first formulated in 1955 after the PFA Act 1954 was enacted.

3. Fruits Products Order were passed by the government in 1946, These specify the minimum standards for all types of foods that are marketed'FPO Certification'.

- These standards are to protect the quality of fruits and vegetables and any products manufactured by them.

It also specifies the conditions of hygiene and sanitation required to be maintained by the manufacturers

It gives specification for the contents of labels and the type and nature of packaging

to be used. The manufacturer should posses a license for the production and sale of the products. The main aim is to determine the minimum quality standards

4. ISI Mark' – a certification mark of the Bureau of Indian Standards (BIS).BIS has published over 15,000 standards, but the consumer is concerned with 2000 products based on international standards

Indian standards cover food items, electrical goods, soaps, detergents, paints, paper etc. only some are mandatory

ISI MARK - This guarantees quality of every batch in production process (use of components, testing standard of product, in-process checks, qualified technical personnel).ISI license is granted by the BIS for 1 year only and performance of manufacturer is monitored before renewal. Look for ISI mark on baby food, mineral water, electrical and cooking gas appliances, pressure cookers, cement, steel, etc.

They are Vanaspathi,Food additives, LPG Cylinders,Cement, Oil pressure stoves, Appliances used in mines and other hazardous areas, Kerosene wick stoves,Mineral water

- ISO 9000 Standards – these are brought out by International Organization for Standardization (ISO) and are internationally accepted.
- ISO is an independent organisation. ISO 9000 standards institutionalize all activities relating to quality.
- ISO 9000 series of standards have been adopted in totality by BIS and have been brought as IS 14000 / ISO 9000 series of Indian standards
- BIS is the Indian representative on ISO.

Benefits are Customer orientation, Marketing advantage, Recognition of company,Confidence creation, Consistence of quality,Productivity improvement, Legal safety, Cost effectiveness,Competitive advantage

- 'Hall mark quality standards for gold – is given by BIS for the exact gold content in jewellery.
- This indicates Carat age or number indicating gold content on a scale of 1000.

Jewellers must first become 'BIS Certified Jewellers and only they can get their jewelry assayed and hallmarked

5. HALLMARK:

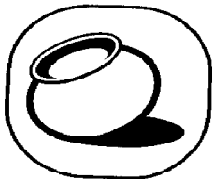
Jewellery is hallmarked from a BIS recognized Assaying & Hallmarking Centre (A&HC).5 compulsory symbols make hallmark:

- Fineness in millesimal number.
- Assaying & Hallmarking Centre's mark.
- Year of marking ('A' = 2000)
- Logo of BIS certified jeweler / manufacturer.
- HALLMARK for GOLD ornaments: licence granted to manufacturer on meeting IS-1417 for purity
- HALLMARK indicates the jewellery conforms to the marked fineness of gold content. DON'T trust Karat meter which tests only surface fineness
    - 958 = 23 carat
    - 916 = 22 carat
    - 875 = 21 carat
    - 750 = 18 carat
    - 585 = 14 carat
    - 375 = 9 carat

6. Eco Mark – is a scheme launched by BIS for labelling products as environmentally friendly. An earthen pot has been chosen as the logo. Any product carrying this logo signifies that the product does least damage to the environment. A product eligible for Eco mark has to satisfy BIS standards also and hence carries both marks.

ECOMARK 1991 every consumer product we buy has an impact on the environment. It is important to know which ones have less impact to improve the quality of the environment and to encourage sustainable management of resources.

Eco mark Product Categories



- Soaps &detergents, Plastics,Paper,Food items, Edible oils, tea and coffee, Beverages, infant foods and processed foods Wood substitutes,Textiles, Preservatives & food additives,Cosmetics,Paints,Batteries,Lubricating oils,

  Packaging materials, Aerosol,Electrical / electronic goods

- 'Wool Mark – is the standard mark of the International Wool Secretariat established in 1949.Wool mark is a certification mark on wool and woolen garments of quality. Wool labeling is done in terms of wool, reprocessed wool, reused wool, and wool products. The terms virgin wool and new wool are restricted.

- Sanforization– is a process which controls shrinkage in fabrics like cotton, linen, and rayon. If fabrics undergo this process called as 'comprehensive shrinkage' can be stamped with this mark. These fabrics have undergone rigid tests of shrinkage, smoothness, crease recovery, tensile strength and tear strength and has a residual shrinkage of only 1%.

- Mercerization– is a process of treating fabrics like cotton, linen, and rayon. to give them strength, absorbency, and luster. This process may be done on the fiber or fabric. Protection, Product safety can only be assured to the consumer if there is an infrastructure legally established to enforce on producers and manufacturers. In India now we have a National Quality Control Council.

Guarantee or Warranty'

- Guarantee is an assurance of the quality and service of and / or the useful life to be expected from a product for sale, often with a promise of re-imbursement or an exchange or a replacement.
- Warranty is a written guarantee of the integrity of the product and of the makers responsibility for the repair and replacement of defective parts.
- Legislation
- Consumer Education and Service &Consumer Protection Societies, Unions, Associational and Forums

7. Standards of Weights & Measures Act & Rules Protecting the Consumer :

The weighing balance, the measuring rod and the calibrated container are the tools for consumer protection

- In a shop one must check Verification Certificate of Institute of Legal Metrology (ILM) must be displayed prominently in all shops using weights/measures.
- A weighing balance not of metal and without pointer is illegal. It does not display the correct weight.
- Every weight has to be stamped on the reverse with the last two digits of the year (e.g. 03 for

2003) & the unit no. of the Inspector. Refuse non-standard weights like stones, iron pieces etc. and if the lead filling is missing on reverse.

- Balances and Weights Any balance and scale made of wood and using string to suspend the pans is illegal.
- For sale of waste paper check that the buyer'sweights are stamped up to date and he uses a metal beam scale with pointer linked by unrusted chains to metal pans.
- On electronic weighing instruments the verification seal is on a plate fixed to it.
- Weight of tray not to be included with veg/fruit bought.

Cloth, Alcohol, Sweets

- When buying cloth check the measuring rod is of steel of one metre or more with the ILM's seal at either end.
- Packed readymade garments must have sizes only in cms. "XXL, XL, L, M, S" etc. are illegal and do not indicate exact measurement.
- For dispensing alcohol, the peg measure must be of glass or brass that is well-tinned or silver-plated. Standard pegs are of 60 ml. (1 peg) and 30 ml. (1/2 peg) bearing 2003 verification seal.
- Sweets, including those in syrup (rossogulla, gulabjamun), must be sold by weight.

Jewellery& Rations

Jewellery and Ration Shops shall have weighing scales clearly visible and close to the consumers.

Jewellery shops must use only class-I or class-II balances protected from breeze, any disturbance and verified up to date.

For your own protection, insist on HALLMARK gold ornaments with BIS logo & marked fineness.

PACKAGED COMMODITIES RULES

1. Every package shall carry Name and Address of Manufacturer or Packer.
2. Net quantity of the package (NOT gross or "weight when packed").
3. If sold by number, the number contained in the package.
4. Month and year of manufacture or pre-packing.
5. In case of food items, 'best before' or expiry date.
6. If imported, name and address of the importer with valid registration.
7. MRP inclusive of taxes. No pre-packed commodity can be sold above the declared MRP in shops, hotels, restaurants, bars (including bottled water, soft and hard drinks).

L.P.G.

- Check the weight of the cylinder with the spring balance available with the distributor or the delivery man.
- The net quantity is 14.2 kg while the empty cylinder weight is 15 to 17 kg.
- If you take delivery from the distributor's store you pay Rs.8/- less.

P.O.L.

- Fuel Stations must display conspicuously a verified can by which you can check the quantity of the actual supply.
- Totaliser is mandatory for every fuel station to check accuracy of dispensing unit.
- The Anti-Adulteration Cell will check any complaint regarding spurious P.O.L.

Kerosene Oil

- Check ILM's verification on the measure and the bottom that should have no cut mark or dent or re-welded.
- Ensure measure is filled to the top hole.
- There should be no lather in the drum or measure.
- Ensure there is no wax or sponge in the measure.

Other marks

- **The Vegetarian Mark (green dot symbol) and the Non-vegetarian Mark (brown dot symbol).** Either of this is mandatory for packaged food products. To distinguish between vegetarian and non-vegetarian food.
- **The Non Polluting Vehicle mark** on motor vehicles certifying conformity to the **Bharat Stage emission standards.**
- **The India Organic Certification mark** for organically farmed food products. Certifies that the product conforms to the specifications of National Standards for Organic Products, 2000 and any eventual amendments.

The certification is issued by testing centres accredited by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the National Program for Organic Production of the Government of India.

IN TEXT QUESTIONS

I. Short answer questions

1. List down different standard marks used for products.
2. What are the rules to be followed for packaged commodities.

II. Long answer questions

1. How do you identify the correct weights and measures?

III. Activity

Choose any five products from your home and draw the standardization symbols from those packets and write the details given on it.

UNIT - 30

CONSUMER PROTECTION – LEGAL MEASURES

Consumer movement may be described as the collective power of consumers to take a country forward with respect to awareness, education, and development.

Consumer movement is conceived as a social movement which seeks to enhance the economic well being and bargaining power of consumers.

There are four main methods of protecting the interests of consumers:

Business Self-regulation: The business community itself can help in achieving consumer protection and satisfaction through self -discipline. Businessmen can regulate their own behaviour and actions by adopting higher ethical standards. Trade associations and chambers of commerce can check unfair trade practices used by some businessmen.

Consumer Self-help: Every consumer must be alert as self-help is the best help. They should educate themselves and know their rights. The should not allow unscrupulous businessmen to cheat them.

Consumers' Associations: Consumers should form voluntary associations. These associations can educate and awaken consumers. They can take organized action and put pressure on businessmen to adopt fair trade practices.

Government Regulations: The State can ensure consumer protection through Legislative, Executive and Judicial Actions. The laws enacted by the Government must be strictly enforced by the executive. Government of India has enacted several laws to protect the interests and rights of consumers.

Consumer legal protection has mainly three broad categories:

i. **Consumer Protection System:** Policies, laws, institutions and structures that form the framework for a consumer protection system,UN Guidelines, Consumer Protection Agencies/Organizations, Consumer Protection Law, Consumer Redress

ii. **Consumer Protection in the Marketplace:** Various transactions that consumers enter in a market economy, Consumer information, Product safety and liability, Consumer credit, Insurance, Electronic commerce

iii. **Consumer Protection and Basic Needs:** Consumer education in the provision of utilities like, Food, Health care delivery, Sustainable consumption

iv. **Consumer Protection System:** Rationale for consumer Protection addresses disparities in consumer-supplier relationship

Bargaining Power, Knowledge, Resources

State intervention premised on grounds of economic efficiency, individual rights, distributive justice, achieving bargaining equality between consumer and producer interests, alleviating the problems of the particularly disadvantaged, poor, elderly, children.

"Consumerism, especially in the developing world, is now seen as a fundamental part of the strategy to eradicate poverty and to bring socio-economic justice to the underprivileged."

- Positive communal values
- Right to development

Laws to Protect Consumers:

- The Essential Commodities Act, 1955 which aims to regulate and control the production, supply distribution and prices of essential commodities.
- The Prevention of Food Adulteration Act, 1954 which aims to check adulteration in food items and eatables.
- The Drugs and Cosmetics Act, 1940 which seeks to ensure purity and quality in drugs and cosmetics.
- The Standards of Weights and Measures Act, 1956 which aims at ensuring that consumers get the right weight and measurement in products.
- The Household Electrical Appliances (Quality Control) Order, 1976 which seeks to ensure safety and quality in the manufacture of electrical appliances.
- The Consumer Protection Act, 1986 which seeks to provide speedy and inexpensive redressal to the grievances of consumers.

Laws like the Indian Penal Code, Indian Contract Act, Sale of Goods Act, Drugs and Cosmetics Act, Agricultural Produce (Grading and Marking) Act, have existed since pre-independence, but none enshrine Rights of Consumers, nor provide swift remedy.

- **Helpful Laws for Consumers:** Arbitration & Conciliation Act to resolve disputes quickly without recourse to courts.Citizens' Charters stating intentions of Banks, Insurance agencies, govt. depts. in providing services to consumers.
- **Pro-Consumer Laws:** Drugs & Cosmetics Act ensures ingredients are listed on packaging of all drugs and cosmetics with expiry date and precautions on harmful effects.Bureau of Indian Standards Act certifies that products meet ISI standards.Agricultural Produce (Grading and Marking) Act standardizes such products for AGmark.
- **Consumer Friendly Laws:** Competition Act prevents practices with adverse effect on competition; promotes & sustains competition in markets; protects interests of consumers & ensures freedom of trade.
- Legal Aid Services Act provides free legal aid.
- Cable TV Act & TRAI protect consumer's choice.
- Trade & Merchandise Act for trademarks to prevent consumer being cheated by spurious product.

i. **FPO** and **MFPO:** The Fruit Products Order (FPO) lays down minimum standards of quality of fruits and vegetable products and processing facilities.

Meat Products Order provides means to:

a. Detect and destroy meat of diseased animals.

b. Ensure that preparation & handling of meat & meat products are conducted sanitarily.

c. Prevent use of harmful substances in meat foods.

d. Ensure that meat is inspected before sale for wholesomeness.

e. Prescribes procedure for selection of disease-free animals & slaughter house practices.

Prevention of Food Adulteration Act

- Prohibits manufacture, sale & distribution of adulterated foods & foods contaminated with toxicants and misbranded foods. Food is deemed to be adulterated if:
- The article sold by a vendor is not of the nature, substance or quality demanded by the purchaser and as it is represented to be.
- Contains any other substance or is processed as to affect injuriously the nature.
- Any inferior or cheaper substance has been substituted wholly or in part for the article.
- Protective Legislation

Water and Air Pollution Prevention Acts

- Household Electrical Appliances (Quality Control) Orders prohibit manufacture, storage, sale of 40 appliances unless they have ISI mark.
- Freedom of Information Act to provide access to information for citizens.
- Dangerous Machines (Regulation) Act for compensation to labour operating machines.

Other Laws to Protect Consumers

- Companies Act prescribes information to be given to investors and government.
- Sale of Goods Act stresses that the buyer must be aware when buying.
- Drugs and Magic Remedies (Objectionable Advertisements) Act prohibits advertising cure-alls and magical cures (talisman, mantra etc.).
- Insecticides Act prescribes safety information, dosage, antidotes.
- Consumer Protection Act 1986 is unique in the world
- Exclusive courts for consumer disputes in all districts, state and national capitals.6 consumer rights specified. Consumer Protection Councils from national to state and district levels. Covers private, public, cooperative sectors.

Consumer Organizations are advocacy groups that seek to protect people from corporate abuse like unsafe products, predatory lending, false advertising and pollution.

A Consumer Organization is an organization of, for & by the consumers Their main object is to cater to the needs of the consumers who are generally exploited by merchants and sellers The efforts of the consumer can be more effective only when they unite to work together, share with and learn from others experiences. Consumer organizations are also advocacy groups that seek to protect people from corporate abuse. Unsafe products, predatory lending, false advertising, astro turfing and pollution are all examples of corporate abuse.

List of Customer Organization

- CERC (Consumer Education and Research Centre)
- FEDCOT (Federation of Consumer Organisations in Tamil Nadu)
- Citizen Consumer and Civic Action Group
- Consumer Voice
- SMN Consumer Protection Council
- Consumer Guidance Society of India
- CUTS (Consumer Unity of Trust Society)
- Ministry of Consumer Affairs
- Mumbai Grahak Panchayat
- CONCERT (Centre for Consumer Education Research, Teaching, Training and Testing)
- Bureau of Indian Standards

Consumer Education and Research Centre (www.cercindia.org): This is an Ahmedabad-based NGO that has worked on protecting the rights and interests of consumers through redressal, advocacy, research and media exposure for over 28 years. You can register your problems on this website by becoming a member by paying a fee. It has a formidable success record and also helps consumers to file appropriate litigation. Its website posts interesting success stories that encourage consumers to sign up as members. It also publishes a useful magazine called Insight and also has a product-testing laboratory.

Consumer Education and Research Centre (CERC), set up in 1978, is a non-political, non-profit and non-government organization dedicated to the education and empowerment of consumers as well as promotion and protection of consumer interests through effective uses of education, research, the media and law.

Beginning with a protest against a bus fare hike, CERC started handling complaints of ordinary consumers who could not take on the might of business. CERC has three major goals – to make consumers aware of their rights, to help them protect themselves and to make providers of goods and services accountable.

Its activities include, besides comparative testing of products, complaints handling, legal advice and litigation, consumer education and awareness programmes, library and information service, publication, advocacy, investor and environment protection.

At CERS's in-house laboratory, comparative testing is conducted in four product categories, viz. food, pharmaceuticals, personal care products and domestic electrical appliances. Other than in Japan, CERC's in-house lab is the only one of its kind in Asia. CERC has added a new dimension of energy consumption testing to its laboratory for electrical products; cooling and heating appliances, motors and pumpsets, fans and lightings.

The products are tested, evaluated, rated and ranked. The test reports identify the brands and their manufacturers and are published in the national press. For 15 years, from 1998 to 2013, the test reports were published in CERC's priced, mainly subscription based, national bimonthly 'INSIGHT –

The Consumer Magazine'. Currently, CERC publishes a national consumer magazine in Hindi – 'GrahakSathi'.

The organisation has published a large number of books, booklets, posters and videos on consumer protection. It has drafted a Bill on Freedom of Information and has been active in innovative use of law.

The CERC campus is spread over 10,000 sq. m and the organization has a staff strength of 53. CERC runs training programmes for representatives of consumer organisations in India and abroad. The organisation is managed by a Board of Trustees.

Today, with 37 years of service to the consumer behind it, CERC looks forward with determination to doing far more in the future than it has already done.

FEDCOT (Federation of Consumer Organisations in Tamil Nadu)

The Federation of Consumer Organisations of Tamil Nadu and Pondicherry, well known by its acronym, FEDCOT, is a nation-wide non-governmental organisation that is voluntary non-profitable, non-political, civic-minded, secular and registered under Societies Act (Registration Number 227/90) to work for the promotion and development of consumers' interest and their welfare. Freedom fighter R.R.Thalavai was responsible for the founding of the organisation in 1990. It is an umbrella body of more than 350 registered consumer associations in Tamil Nadu and Pondicherry. It is one of the largest consumer organisations in the country and in Asia working at grass-roots level. It embraces people from different walks of life. It is significant that sixty percent of the member councils are in rural areas. FEDCOT is a consumer movement of the people, by the people and for the people. It is concerned with human values.

Objectives

- To promote a network of organisations working for consumer awareness and for the promotion of consumer's interest.
- To strengthen the growth of the organised consumer movement in India.
- To resolve consumer issues and educate on the rights and responsibilities of consumers.
- To promote through the purchasing power of consumers a "need–oriented development" that will ensure socio- economic justice and environmental quality of life for all.
- To identify issues and to pool resources for campaign, lobbying and policy advocacy.
- To provide relevant and updated information.
- To maintain laison with the governments at the Centre and the State.

Citizen Consumer and Civic Action Group

Citizen consumer and civic Action Group (CAG) is a non-profit, non-political and professional organisation that works towards protecting citizens rights in consumer and environmental issues and promoting good governance processes including transparency, accountability and participatory decision-making.

CAG came into existence on 7 October 1985 as a non-profit, non-political, non-religious, voluntary and professional citizens group based in Chennai, India. S. Govind Swaminadhan, legal practitioner and former Advocate General of the State of Tamil Nadu was the founding trustee of CAG.

The Group was originally christened Consumer Action Group. After a decade we decided to change it to CAG (Citizen, Consumer and Civic Action Group), keeping in mind the larger role that groups such as ours have to play, specifically, issues affecting the common citizen such as extreme pollution, lack of access to information, poor quality health care and civic amenities have emerged as priorities in the work undertaken by CAG.

CAG Objectives

Over the last five years, the main activities have ranged from campaigning for greater access to information, monitoring the functioning of public utilities and advocating for greater transparency and accountability in governmental and private sector functioning to decentralize and localized urban planning, and the protection of open spaces and our natural environment.

CUTS International (Consumer Unity & Trust Society) began its journey in 1983 in Rajasthan, from a rural development communication initiative, a wall newspaper Gram Gadar (Village Revolution). This monthly wall newspaper is published regularly and has been instrumental in providing a forum for the oppressed classes to get justice. On seeing Gram Gadar, Rubens Ricupero, Secretary-General of UNCTAD (1995-2004) observed: "It confirmed that lack of awareness lies at the root of so much misery"

Consumer Voice (http://www.consumer-voice.in): Delhi-based Consumer Voice is a consumer advocacy group that also publishes a magazine by the same name as well as an e-newsletter. It informs and educates consumers about their rights and advises on grievance redressal. It has a strong comparative product section and is among the few NGOs that openly offers 'best buy' suggestions for a range of products which have been tested and verified. It allows consumers to register their complaints online and also provides a complaint status. It has a discussion forum that is, however, not very active.

Registered in 1999, VOICE Society was promoted by the Voluntary Organisation in Interest of Consumer Education (VOICE), a consumer protection group set up by teachers and students in 1983 with the avowed objective of promoting and strengthening consumer education in India. Its main mission is to empower consumers through comparative product testing and services evaluation; to propagate the concept of Best Buys in relation to product and service performance; to develop a centre for comparative testing of goods and services based on international norms; to educate consumers about good business practices in competitive market; to trigger a change by sensitizing stakeholders towards quality products and services.

Consumer Guidance Society of India (http://www.cgsiindia.org)

It was set up in 1966 and has a long record of consumer advocacy, grievance redressal and also offers guidance on filing lawsuits in consumer courts. It publishes a consumer magazine called Keemat. Its website has a forum that offers a step-by-step guide on how to file complaints to make them effective. A 'Know Your Rights' section provides different problem scenarios and how to deal with them. People are encouraged to become members to avail benefits including access to its library and other data. 51 years in the service of consumers.The Consumer Guidance Society of India (CGSI) is the first and foremost consumer body of the country.

Mumbai Grahak Panchayat

Mumbai Grahak Panchayat (MGP) is a registered voluntary consumer organization established in 1975. It has more than 20,000 members in and around Mumbai (Bombay) to whom it supplies about 75

essential commodities at their doorstep, every month.MGP's joint purchase and distribution system has been acclaimed by Consumers International which supports, links and represents consumer organizations all over the world.To enable consumers to exercise their choice, especially before festivals, MGP also has Consumer Plazas at different locations in the city, for 10 days every year. Items like readymade clothes, bed sheets, bags, sarees, utensils, crockery are sold at reasonable rates.

Bureau of Indian Standards

The Bureau of Indian Standards (BIS), the National Standards Body of India is involved in the development of technical standards (popularly known as Indian Standards), product quality and management system certifications and consumer affairs. It resolves to be the leader in all matters concerning Standardization, Certification and Quality.

In order to attain this, the Bureau strives:

- To provide efficient timely service.
- To satisfy the customers' needs for quality of goods and services.
- To work and act in such a way that each task, performed as individuals or as corporate entity, leads to excellence and enhances the credibility and image of the Organization.
- BIS would achieve these objectives by working in close cooperation with all concerned organizations and by adopting appropriate management systems, motivating and ensuring active participation of all the employees.

Objective

- Harmonious development of standardization, marking and quality certification
- To provide new thrust to standardization and quality control
- To evolve a national strategy for according recognition to standards and integrating them with growth and development of production and exports

Consumer Association of India

Consumer Association of India (CAI) is a membership-based organisation with 8,000 registered members all over India. Its main objectives are: spreading consumer awareness; empowering consumers and teaching them their responsibilities and rights as consumers. CAI regularly conducts seminars, workshops and training programmes and publishes various consumer guides on a variety of topics, which are of interest to consumers.

A new division of CAI was established in March 2007 to help consumers affected by cyber crimes in collaboration with Cyber Society of India. CAI has also set up a mini drug lab to test spurious drugs in association with its sister organisation, CONCERT.

The Consumer Coordination Council (http://www.corecentre.co.in): It is a government organisation that was set up with the support of the Ministry of Consumer Affairs and tries to bring together all the consumer organisations. It also has its own complaint registration section but sees its role as being one of information gathering on consumer-related issues, empowering consumer groups and influencing policy.

INTEXT QUESTIONS

I. Short answer questions

1. What are the four methods of protecting consumers?
2. List down the consumer protection organisations working in India.

II. Long answer questions

1. Explain the role of any one consumer protecting organisation.
2. Descibe about various consumer laws enforced by the government.

III. Acitivity

Collect samples from near by grocery stores and detect the adulterants in it by physical observation.

MODULE VII
TEXTILE SCIENCE

UNIT - 31

INTRODUCTION TO TEXTILE SCIENCE

We all know that food, shelter and clothing are the basic needs of mankind. Clothes are made from textiles and our homes are made more comfortable and attractive by the use of textiles. Textiles have an important role in our daily lives. From the earliest times, people have used textiles of various types, for covering the body, warmth, personal adornment, to display personal wealth.

Objectives of Textile Science:

After studying the Textile Science, the student will be able to:

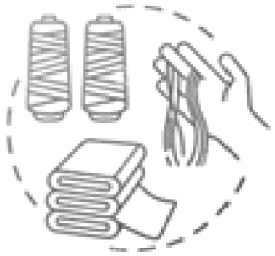
- Define the meaning and scope of fabric science
- Know the meaning of fiber and classify them based on their length and origin
- Can explain the properties of various fibers, their suitability and end uses
- Learns to identify the type of fiber by physical tests

1. Scope of Textile Science

When you observe around, not only the clothes that you are wearing, you will also find many items used in your home are made with fabrics, like table cloth, kitchen napkins, curtains, sofas, sofa covers, beds, bedsheets, pillow covers, blankets and house decor items are made with fabrics. Any cloth is called as a fabric. The fabrics and items made with fabrics are generally termed as textiles.

Why learn Textile Science?

- A study of Textile science will show, why certain fabrics are more durable and therefore more suitable for specific purpose.
- It will explain why certain fabrics make cold weather apparel and why certain fibers are suitable for summer.
- Knowledge of textiles will help in assessing of standards and brands of fabrics and will develop the ability to distinguish quality in fabrics.



Fibres and items made with fibres

- You will understand about finishing of textiles and value addition by dyeing and printing
- You will learn, how to clean and take care of textiles

Textile - The word textile comes from the Latin term "Textere" meaning to "Woven". Today the word textile is more generalized and refers to the product made from fibers.

Fiber: Do you know how a fabric is made? Pull out a thread from a cloth and observe. If you open the twist of the thread, you will see, many fine, hair like strands are twisted together to make a thread. These strands are called as fibers.

A fiber is any product capable of being woven or otherwise made into a fabric. It may be thought of as the smallest visible unit of textile production. Fiber can be defined as a pliable hair like strand that is very small in diameter in relation to its length. Fibers are the fundamental units or the building blocks used in the making of textile yarns and fabrics.

Classification of fibers:

Many textile materials are available in the market and many new fibers are being constantly developed. Hence to make it easy for identification and to make wise choice in buying of textiles, classification of fibers is necessary. Textile fibers are classified according to the source and the length of the fibers.

According to the source of the fiber: According to the source from which textile fibers are obtained, fibers are broadly classified in three ways viz,

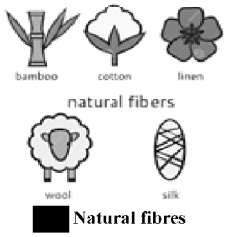
- **Natural**
- **Manmade**
- **Synthetic**

Natural fibers: Natural fibers are further divided into following three categories. They are,

a. Vegetable fibers or Cellulosic fibers

b. Animal fibers or Protein fibers

c. Mineral fibers



a. Vegetable fibers 'or' Cellulose fibers:

As the name indicates these fibers are obtained from vegetable source like plants and cellulosic for this category includes cotton, which makes up nearly 50% of total fibers used in world (by weight). Hence it is considered as major fiber. This category also includes other minor fibers such as Linen, Jute, Pineapple, etc.

Animal Fibers 'or' Protein fibers:

There are several animal fibers each obtained from a different source, but only two are recognized as major textile fibers - Wool and Silk. They make up small proportion in the market (by weight) but a much higher proportion by value. Other minor fibers in this category are Mohair, Cashmere, Angora, and Camel hair.

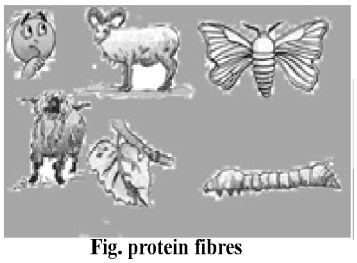


Fig. protein fibres

Mineral Fibers:

Natural fibers obtained from minerals are known as mineral fibers. Asbestos is a natural fiber obtained from varieties of rock. It is an acid proof, rustproof, flameproof fiber. However, the use of asbestos is now rapidly declining following the discovery of health risks from asbestos dust.

Manmade Fibers:

As the name indicates, these fibers are not naturally present in nature, but they are synthesized by using chemicals. Sometimes, natural sources such as cellulosic, protein are also used to synthesize these fibers, called as "regenerated fibers". They are of three types.

Cellulosic Source - The fibers are manufactured from a natural polymer Cellulose that is obtained from wood. These are further divided into:

i. Regenerated Fibers: The starting product is cellulose, which is dissolved in sodium hydroxide and the viscous solution is extruded through spinneret into dilute H_2SO_4.

ii. Modified Regenerated: The raw material here is also cellulose, but these fibers are modified chemically so that polymer can be dissolved in an organic solvent and extruded into hot air which evaporates the solvent.

Protein Fibers - These are made from the protein sources. The fibers include, Soya bean and Azlon.

Mineral Fibers - These fibers are glass, steel and carbon, all of which are found in industrial end uses.

Synthetic fibers:

The term synthetic means that the polymer is entirely man made from chemicals. The fiber properties are dependent upon their chemical compositions and kinds of molecular orientation. The major synthetic fibers include Nylon (polyamide produced in U.S.A in 1938), Polyester (produced in 1953), Acrylic (produced in 1948).

According to the length of the fiber: According to length, fibers are classified into two types:

- Staple fibers
- Filament fibers

Staple fibers:

Natural fibers are short length fibers which measure in inches or fraction of inch Ex: ¾ to 18 inches. Except silk, all other natural fibers are staple fibers. Manmade fibers are made in filament form but can be cut into short staple lengths for particular end uses.

Filament Fibers:

Long fibers those measured in yards or meters are known as filaments. Silk and all man-made and synthetic fibers are filaments.

INTEXT QUESTIONS

I. Short Answer Questions

1. What is a fiber? Give some examples of fibers.
2. What are synthetic fibers?
3. Classify textile fibers based on their length.

II. Long Answer Questions

1. Discuss in detail about natural fibers.
2. Draw the classification of textile fibers and explain about each class.

EXPERIMENT

Take a piece of fabric and pull a bunch of threads. Untwist the yarns, take out fibers with the help of a pin and measure the length of the fibers with a scale. What did you observe? Is the length of the fiber measurable in inches or the fiber is longer than the scale? Note down their length and whether the fiber is a filament or stable. Repeat the same process for some more fabric samples.

Properties of fibers:

The second step in the process of learning textiles is to know how to qualify a material for a specific use. In order to do so, the product must possess some essential characteristics or properties.

Physical properties:

1. **Length of the fiber:** Textile fibers are available in different lengths. Filaments are long continuous fibers of indefinite length measured in yards or meters. Staple fibers are short fibers measured in inches or centimeters and range in length from ¾ " to 18". All natural fibers except silk are staple fibers. Man-made and synthetic fibers are all filament fibers. Sometimes filament fibers are cut into staple length.
2. **Appearance:** The physical shape of the fiber contributes to resistance to abrasion, pilling and comfort factors such as absorbency and warmth. The cross-sectional shape can be changed for all synthetic fibers unlike natural fibers.
3. **Absorbency:** All textile fibers are naturally hygroscopic (they pick up moisture from air). But the amount of moisture the fibers absorb may differ. Fibers that absorb water easily are known as hydrophilic (water loving) fibers. Examples are natural protein and vegetable fibers, rayon and acetate are hydrophilic fibers. Fibers that have difficulty in absorbing water are known as hydrophobic fibers. Many synthetic fibers are hydrophobic in nature.
4. **Strength or tenacity:** The strength of the fiber must be adequate for processing or spinning into a yarn and further making into a fabric. A strong fiber is durable, resists sagging and pilling. Glass ranks first in strength than the other fibers. Next is Nylon and Polyester. Some of these fibers lose

or gain strength when wet. A good example for loss of strength during wet condition is Rayon and for gaining strength is cotton.

5. **Heat conductivity:** Did you notice that we feel comfortable when we wear some garments and we feel hot with some other garments? This is mainly due to the heat conductivity of fabrics. Heat conductivity is the ability of fibers to conduct away heat from the body.

6. **Resilience:** Try to crumble and hold a woolen sweater in to a ball. What happens after you stop exerting the pressure? It will spring back to its original shape.This ability of textile fibers to spring back to their original shape after removing the stress is known as resilience. This property determines the aesthetic appearance of textile materials. Fabrics with good resilience do not hold wrinkles and creases, does not require ironing every time after washing.

Chemical properties: The reaction of fibers to various chemicals is helpful in use and care of fabrics, chemical reactivity is the effect of acids, alkalis, oxidizing agents and solvents.

Biological properties: Biological & other properties such as ageing resistance, sunlight resistance, resistance to moths, mildew and microorganisms play an important role in determining the performance of fabrics in use and care.

Table 27 Properties of Textile Fibers

S. No.	Characteristics	Cotton	Wool	Silk	Rayon	Nylon	Polyester	Acrylic
1.	Length of the fiber	Fabric is woven with staple fibers.	Staple fiber, coarser fabrics such as blankets are made with staple fibers, suit materials are made with	longer fibers. Longest fiber among all natural fibers.	It is a filament fiber and can be made in to any length.	Filament fiber and can be made in to any length.	Filament fiber and can be made in to any length.	Filament fiber and can be made in to any length.
2.	Appearance	It is a dull fiber, gets dirty quickly due to fiber structure.	Dull, wavy and rough fiber with scaly structure	Smooth, shiny and straight rod like structure, sheds dirt easily, and does not look dirty even after many wears.	Smooth and shiny appear-ance, sheds dirt easily.	Smooth and shiny clear rod like structure, resists dirt and easy to wash.	Smooth surface, does not absorb stains, transpar-ent, rod like appearance and easy to wash.	Appears like wool but under micro-scope, shows rod like structure with speckles.

3.	Absorbency	Absorbs moisture easily and dries quickly. So used for towels, kitchen napkins and any wiping cloth. Cotton can absorb perspiration quickly and dries up fast, does not stick to the body and keeps the wearer cool, suitable for summer clothing.				Does not readily absorb moisture. Keeps the wearer warm and does not absorb perspira-tion, causes discom-fort during hot climate. Not suitable for summer wear.	Absorbs less moisture, does not absorb perspira-tion easily, not suitable for summer clothing.	Does not absorb moisture readily, makes it difficult to dye. Makes the wearer warm, does not absorb perspira-tion, not suitable for summer.
4.	Heat conduc-tivity	Good conductor of heat, thus, conducts the heat away from the body and keeps the wearer cool.				Poor conductor of heat.	Poor conductor of heat.	Poor conduc-tor of heat. Suitable as winterwear.
5.	Strength	Stronger when wet, so can be rubbed hard during washing, without damaging the fabric.	The fiber becomes weak when wet, weakens when pressure is applied by rubbing, tends to mark	Silk is a very strong fiber, but loose strength when wet.	The fiber loses strength when wet, avoid rubbing during washing.	Strongest fiber, among all fibers. Does not loose strength when wet, makes it suitable for industrial textiles.	Very strong fiber, though not as strong as nylon.	Strength is satisfac-tory in both wet and dry condi-tions. Not as strong as polyester and nylon but adequate strength makes it suitable for apparel and home furnish-ings.

6.	Resilience (resistance to wrinkling and creasing)	Wrinkles and creases readily during use and immediately after washing and drying. Requires ironing.	Wool is a very flexible and pliable fiber. Readily springs back to its original shape.	Even though silk fabrics get wrinkled easily, the creases can be removed by hanging.	The fabric wrinkles and creases readily, needs ironing.	Though recovers from wrinkles and creases quickly, requires ironing, after washing.	Has very good crease or wrinkle recovery and requires little or no ironing after washing.	Shows excellent recovery from wrinkles and creases.
7.	Uses	Summer clothing, shirting, suiting, sportswear, undergar-ments, blankets, napkins, towels and wiping cloths.	Used for making winterwear, knitted in to sweaters, gloves, caps, suiting material, the fabric produced is used for coats, blankets, carpets, and home furnish-ings.	Silk is a high value, expensive fabric, used for saris, dress materials, suiting and shirting.	Appears like silk. Used in saris as replacement for silk. Suitable for summer wear dress materials. Used in men's ties, scarves, jackets and home furnishings.	Used in hosiery, socks, apparel, and sweaters, lining for heavy coats etc. Due to high strength, used for ropes, type cords, nets, carpets and home furnish-ings.	Used as dress materials for both men and women, used for making ropes, home furnish-ings.	This fiber is a less expen-sive alterna-tive for wool. Widely used in making of winterwear. Also used for sports-wear and home furnish-ings.

Identification of fibers:

Fibers are the fundamental units of fabrics. Due to the vast variety of textile fibers available, consumers easily get cheated due to malpractices prevalent in the market. To save oneself and to choose the type of fabric for specific purpose, knowledge of fiber identification is very useful.

There are basic tests conducted to identify the fibers present in the fabrics. They are

Visual test

Burning test

Visual test: This is the first test in fiber identification. Experience in feeling and touching the fabrics develops the knowledge in identification of fabrics. Ravel two sets of yarns i.e., warp and weft and untwist them in to fibers, observe the length, luster and texture of fibers.

a. Length of fibers: When you hold the length of yarn against light and observe the surface, you can identify whether the yarn is made up of staple fibers or filament fibers. Except silk, all the natural fibers are staple fibers.

b. Luster: Visually analyze the luster of the fibers, whether they have high, medium or low luster. Silk and most of the synthetic fibers will have high luster, whereas other natural fibers will have dull appearance.

c. Texture: Observe how the yarns and fibers are felt between the two fingers like, soft-to hard; rough to smooth. Except silk, all the natural fibers feel slightly rough to touch.

Burning test: Burning test is used to identify the chemical composition of the fiber such as cellulose, protein, mineral or chemical and helps to identify the group/ class to which the fiber belongs. Ravel/ pull out the warp and weft yarns and untwist them in to fibers. Test each fiber by holding with forceps and by slowly introducing to the edge of the flame and hold for one or two seconds. Observe what happens as the fibers approach fire. Some may burn very fast; some burn slowly and some will curl back and form a bead at the edge of the fiber. Notice any smell/odor given by the fiber while burning or charring. Observe whether ash or residue is formed. Repeat the same procedure for weft yarn also. The following observations should be made and recorded.

i. Nature of ignition or approaching the flame: See whether the fibers ignite readily or slowly melt.

ii. Rate of burning: Observe whether the fiber burns fast, slow or with difficulty when they are in the flame.

iii. After removing from the flame: See whether the fibers burn even after removing from the flame, or self-extinguishing; also observe if there is any afterglow after putting out the flame.

iv. Nature of smell or odour: Observe whether the fibers emit any odour of burnt paper, or hair, chemical or aromatic smell after burning.

v. Nature of the residue or ash: Feel the residue to observe whether it is soft, crisp or hard.

Table. 28 Burning Test of Fibers

Type of the Fiber	Name of the fiber	Approaching flame	Rate of burning	After removing from the flame	Odour / smell	Residue
Natural fibers	Cellulose fibers – Cotton, Linen	Does not shrink away, catches fire immediately on contact.	Burns quickly.	Continues burning, shows an afterglow.	Gives the smell of burning paper.	Light feathery ash, grey in colour.
	Man-made cellulosic fiber – Rayon	Does not shrink away, catches fire immediately on contact.	Burns quickly.	Continues burning, shows an afterglow.	Gives the smell of burning paper.	Light, fluffy ash, in very small amount.
	Protein fiber -Wool	Curls away from the flame.	Burns slowly.	Stops burning after removing from the flame.	Gives the smell of burning hair.	Small black bead, brittle, crushable.
	Protein fiber -Silk	Curls away from the flame.	Burns slowly and sputters in flame.	Stops burning after removing from the flame.	Gives the smell of burning hair.	Bead like, black crushable residue.
Synthetic fibers	Polyester	Melts and shrinks away from the flame.	Burns slowly and melts.	Stops burning after removing from the flame.	Gives the smell of chemicals.	Hard, tough, black-brown bead will be formed.

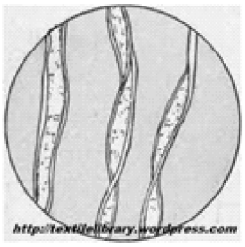
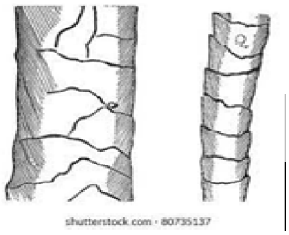
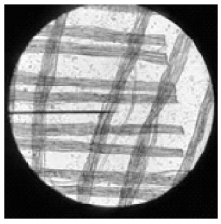
	Nylon	Melts and shrinks away from the flame.	Burns slowly and melts.	Stops burning after removing from the flame.	Gives the smell of synthetics or chemicals.	Hard, tough, black-brown bead will be formed.
	acrylic	Melts and shrinks away from the flame.	Burns quickly and splutters.	Continues to burn, melts, and molten fiber drops	Gives the smell of acid or vinegar.	Irregular, black, hard but crushable beads will be formed.

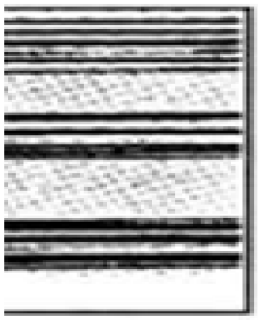
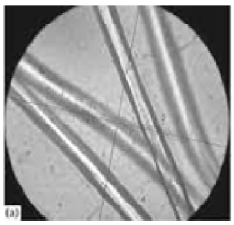
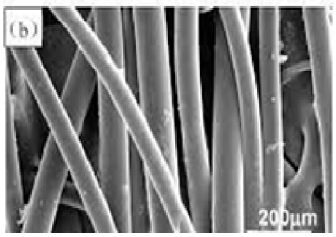
Microscopic test:

Untwist a thread and pull the fine fibers from the yarn. Did you ever wonder what is the original structure of a cotton, wool or silk fiber? You can observe the fine hair like fibers under microscope to know their actual structure, called fiber morphology, which influences the fiber properties. It is the fiber morphology, which makes cotton fiber highly absorbent, wool fiber warm in cool climate, makes the silk fiber shiny, soft, lustrous and so on.

Microscopic test is the third most important test in fiber identification. The microscopic appearance of some major fibers are given below.

Table 29 Microscopic Structure of Fibers

Name of the fiber	Fiber longitudinal structure	Microscopic appearance
Cotton	Flat, twisted ribbon like structure	
Wool	Long cylinder with scales	
Silk	Thin, long, lustrous and smooth cylinder	

Viscose Rayon	Smooth transparent rod like structure	
Polyester	Rod like, smooth, uniform structure	
Nylon	Smooth and clear rod like structure	

IN TEXT QUESTIONS

I. Short answer questions

1. Why is it necessary to identify textile fibers? List the fiber identification tests.
2. Write a short note on visual test for fiber identification.

II. Long answer questions

1. Discuss in detail about burning test for fiber identification.
2. Why is the microscopic test important? Discuss about the microscopic structure of major fibers.

EXPERIMENT

Take a piece of fabric, hold it with a forceps and take it close to a source of flame. Now observe whether the fabric continues to burn, gives any smell, forms a hard bead or crushable bead or gives ash. Note down your observations. What do you think the fiber is, based on your observation?

Is it a natural fiber or regenerated or synthetic? Note down your conclusion.

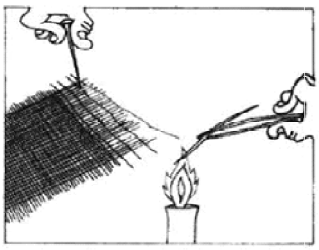
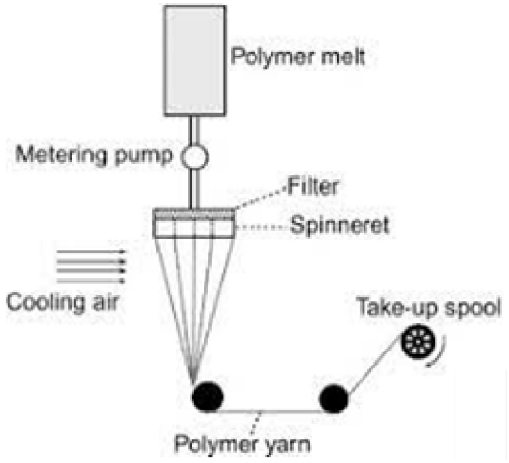


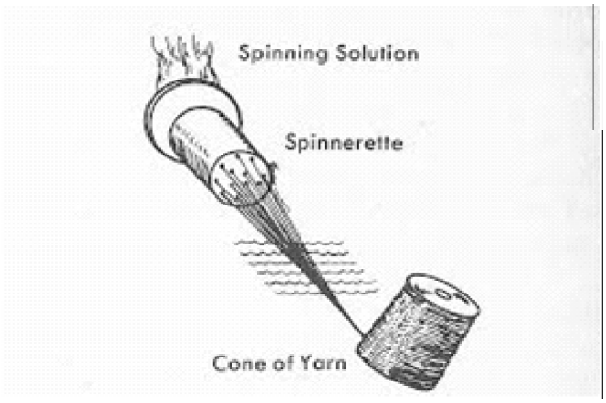
Fig. Burning Test

UNIT - 32

YARN AND ITS CONSTRUCTION

In the previous unit, you have learnt about fiber, yarns and fabrics. A yarn is made by twisting many fibers together to make a thread like structure, suitable for weaving or knitting. This process is called **spinning.** Natural fibers are spun by mechanical spinning, whereas synthetic fibers are spun by chemical means, by passing the melted solution through a device called **spinneret.** The spinneret is a shower head like structure, having many minute pores, through which the fibers are extruded and collected to wind upon cones.





OBJECTIVES:

After learning this lesson, you will be able to

- Define a yarn
- Understand the process of yarn making by spinning
- Explain the meaning of blend and list out few brands of blends available in the market
- Gain knowledge of different classes of yarns
- Understand the difference between a thread and a yarn

A yarn is a continuous strand of textile fibers, filaments, suitable for knitting, weaving to form a textile fabric.

There are different types of yarns and their selection depends on the end use of the product. Each yarn has its own characteristics that vary as per the construction and treatment given in the manufacturing process.

Yarn properties:

In previous unit, you have studied the properties of fibers and understood that fiber properties have great influence on the serviceability of a fabric. The same way yarns also have properties, which influences fabric appearance and durability. The major important properties of a yarn are its **fineness** and **amount of twist** given. Higher the fineness, smoother and stronger will be the yarn. The twist of the yarns is an important factor in weaving. Some times loosely twisted yarns are used in weft direction to create interesting effects in weaves. However, yarns with medium to high twist are used for warp direction, to give strength to the woven fabric. If a yarn is highly twisted, then it gives a crinkled effect to the fabric. Example is georgette fabric. Though it is made with plain weave, it will have crinkled texture as high twist yarns are used in weaving.

Types of yarns:

According to the length of the fibers: The yarns can be classified into two categories based on their length.

Staple yarns: Spun yarns are made from staple fibers and are characterized by protruding fiber ends.

When such properties like absorbency, bulk, warmth, or textures are desired in the fabrics, spun yarns are used. A spun yarn is more comfortable on a hot humid day than a fabric made of smooth filament yarns. Protruding ends contribute to a dull fuzzy appearance, to the formation of pills on the surface of the fabric. They soil readily.

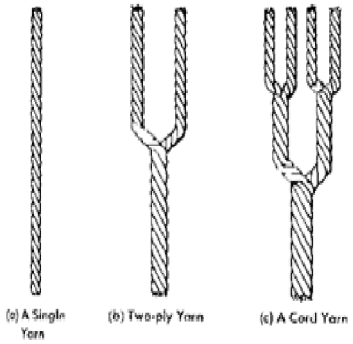
Filament yarn: If the yarn is made with filament fiber, then it is called as filament yarn. The filament yarns are divided into two types, Flat **continuous** filament and **textured continuous** filament yarn.

a) Continuous filament yarns are produced from long continuous filaments. Filament yarns are man-made. Regular or conventional filament yarns are smooth and silk like. Their smooth nature gives them shinier (lustrous) than spun yarns, but the luster varies with the amount of the de-lustering agent used in the fiber spinning solution and the amount of twist in the yarn. Filament yarns have no protruding ends, so they do not shed lint; they resist pilling; and fabrics made from them tend to shed soil.

b) Textured continuous yarns are man-made continuous filament yarns that have been modified by processes to introduce crimps, coils, loops or other distortions into the filament or with high twist or low twist. The addition of twist increases bulk. Texturing gives slippery filaments the aesthetic property of spun yarns by altering the surface characteristics and creating space between the fibers. It also improves the conductivity and moisture absorption of filament yarns.

Differet parts of Yarns: Based on the number of parts in a yarn, the yarns are classified in to simple yarns, double yarns and novelty or fancy yarns.

Simple yarns A simple yarn is like in all its parts. A simple yarn also can be described by the number of parts it has, by the direction and amount of twist in the yarn and by the size of the yarn. Simple yarns are classified as single, ply, and cord. A **single yarn** is the product of the first twisting operation that is performed by the spinning machine. Spun, filament and textured yarns are each example of simple, single yarns. A **ply yarn** is made by a second twisting operation, which combines two or more singles. Each part of the yarn is called a ply. Plying tends to increase the diameter, strength and quality of the yarn. Ply yarns are commonly used in the warp direction of woven fabrics to increase the strength of the fabric. A **cord cable** is made by a third twisting operation, which twists ply yarns together. Some types of sewing threads and some ropes belong to this group. Cords are seldom used in apparel fabric, but used in industrial weight fabrics.



Double yarns This consists of two or more single strands treated as one in the weaving process, but the strands are not twisted together. These are used for ornamental effect as the low twist yarns produce luster and softness.

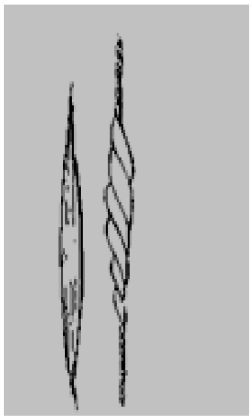
Novelty yarns/fancy yarns

These are irregular at regular intervals. They may be single, plied, or cord, may be spun, filament, or textured, combination of yarn types. These yarns are called as novelty yarns, because of their appearance; they lend an interesting or novel effect to fabrics made with them. Fancy yarns have been more common in drapery and upholstery fabrics than apparel fabrics. Novelty yarns are usually composed of – a base or ground, an effect, a tie or binder yarn. Base yarn controls length and stability of end product. Effect yarn forms the design or effect. Tie yarn holds effect yarn so that it will remain in position.

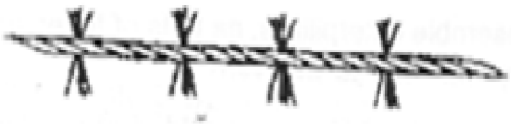
Types of novelty yarns:

Slub yarn: This is a thick and thin yarn made by varying the amount of twist in the yarn at regular intervals. They are found in drapery and upholstery fabrics.

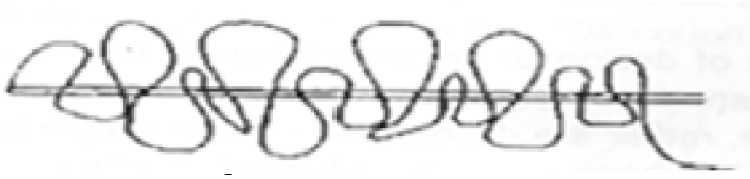
Flock yarn: These are frequently called as Flake yarns. These are usually single yarns in which small amounts of fibers either different colours or luster or both are inserted into the yarn and held in place by twist of base yarn. Eg., tweed fabric. This gives a spotted and short streaky appearance.



Boucle yarn: These are characterized by tight loops projecting from the body of the yarn at fairly regular intervals. They are 3 ply yarns. The effect



yarns form irregular wavy surface and binder ties it to the base. It has a twisted core yarn.

Loop and  ar
semicircula

Snarl yarn or spike yarn: This is made in the same way as loop yarn using a highly twisted effect yarn which forms snarls rather than loops.

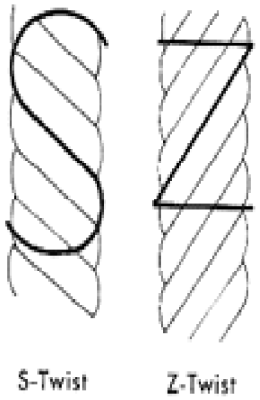
Spiral or cork screw / Eccentric: It is made by twisting together two ply that differ in size, type, or twist.

Yarn twist:

Twist is the spiral arrangement of the fibers around the axis of the yarn. Twist is produced by revolving one end of a fiber strand while the other end is held stationary. Twist binds the fibers together and gives the spun yarn strength. It is a way to vary the appearance of fabrics. The strength of the yarn is measured by the number of **turns per inch.**

Direction of Twist:

The direction of twist is described as S-twist and Z-twist. A yarn has S-twist if, when held in a vertical position, the spirals conform to the direction of slope of the central portion of the letter "S," Z-twist if the direction of spirals conforms to the slope of the central portion of the letter "Z". Z-twist is the standard twist used for weaving yarns. The majority of single yarns are spun with the twist in the Z direction.

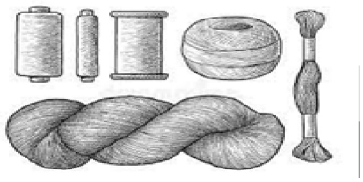


Blends: Some fabrics are made with more than one type of fiber. This mixing of fibers done at the stage of spinning of yarn, by mixing the fibers and giving twist. Fibers are mixed so that the best properties of two or three or more fibers can be brought together in one single fabric. In **polycot**, polyester is blended with cotton. In **cotton silk**, cotton and silk fibers are blended together. Some more blends are **terry cot** (terylene+ cotton), **cots wool** (cotton + wool) etc.

Textured Yarns:

When a yarn is pulled out from a knitted fabric, the originally straight yarn will become curled. This can be called a textured yarn. Usually, texturizing treatment is given to man-made fibers, to set different textures, like wavy, curled, coiled, looped etc. wool is the only natural filament having wavy or crimp structures because of which it keeps the wearer warm. Synthetic fibers such as nylon and polyester are straight rod like filaments with smooth surface, less absorbency and the fabrics made with these fibers tend to be slippery and uncomfortable to wear. Hence, texturizing treatment is given to these filament fibers to improve absorbency, to add bulk to otherwise very fine and delicate fibers, and to make them stretchable. Due to the new texture, spaces are created between the fibers, making them more absorbent and comfortable to wear.

Yarn Vs Thread:



You must have observed sewing machine threads used by tailor and yarns used for hand embroidery. Did you observe any difference? The terms yarn and thread are interchanged in regular usage. But there is a difference between a thread and yarn though they may appear similar. When a yarn is processed further to make even, finer and stronger, then it is called as thread. A thread is made as 2 ply or 3 ply or 4 ply depending on its purpose.

IN TEXT QUESTIONS

I. Short answer questions

1. Write a short note on blends. Give examples.
2. What is a yarn? Explain types of yarns based on length of the yarn.
3. Write a short note on yarn twist.
4. Explain how yarns are made?
5. Differentiate between yarn and thread.

II. Long answer questions.

1. Discuss about various types of novelty yarns.

EXPERIMENT

1. Take out yarn from an old knitted, unused sweater. Untwist the yarn and observe its structure. Identify whether it is a spun or filament yarn. Is the yarn curled? Then the yarn has become textured. Notice the twist in the yarn. Note down all these observations.
2. Pull a yarn from an old sock. Observe its texture. Collect small fabric samples from a clothes' shop or tailor's shop. Pull out yarns from the fabric samples and observe their twist, length and texture. Note down. Draw the yarn structure.
3. Take a ball of cotton. Pull out cotton as a long piece, roll between your hands or keep on table and roll with hands, and then try to twist this piece in to yarn. What type of yarn did you get? What is the length of the yarn that you made? Note down this information.

UNIT - 33

FABRIC CONSTRUCTION

Take a look around your home. Observe closely the textiles used in your home, right from door mats, kitchen napkins to sofa covers, cushion covers, curtains, bed sheets, blankets and clothing items like shirts, trousers, saris and dupattas. Did you observe that, different designs appear on their surfaces and their thickness and weight are also different. Some items like dupattas and saris are very light weight and delicate, whereas some items like blankets, door mats are heavy and strong. If you observe sweaters, socks, stockings, leggings, underwear, their structure is different, they are stretchable and form-fitting. These differences in fabrics are due to the different construction methods used. You have already learnt from previous lessons that different fibers, yarns and finishes give different properties to fabrics. Different construction methods also effect the fabric properties such as thickness, density, brightness or luster, strength, durability, stretchability, ability to keep the wearer warm in cold climate, cool in summer season etc. In this lesson you will learn about various fabric construction methods, their characteristics and specific uses.

FABRIC: In the previous lesson, the student has learnt about what is a fiber, yarn and fabric. The fibers and yarns are converted in to fabric by different fabric construction methods, before the fabric is being made into clothes or garments. A fabric can be made by using different techniques such as

i) Fabrics made from solutions

ii) Fabrics made directly from fibers

iii) Fabrics made from yarns

iv) Composite fabrics

Techniques of fabric construction

Fabrics made from solutions:

Films are made from solutions passed through narrow slits into warm air. It is waterproof and resistant to soil. It lacks strength and has low drapability and are weak unless supported by a fabric. Used for shoes, shower curtains, plastic bags, upholstery. Foams are made by incorporating air into elastic like substance. Rubber and polyurethane are most commonly used. Foams are lofty, springy, and bulky. They are too weak to be used without backing. Used in pillows, chair cushions, mattresses, carpet padding and garments.

Fabrics made directly from fibers:

Felt is a fabric made directly from fibers, by applying heat, moisture and pressure. Traditionally wool has been used to make felts. Felts do not have warp or weft directions, do not ravel or fray. Used for hats, crafts, coats and toys. Non-Woven fabric refers to a fiber web structure. A fabric made by bonding or the interlocking.

Fabrics made directly from yarns:

i) Weaving: Two or more sets of yarns are interlaced at right angles to each other to make into fabric. The fabrics made through weaving are termed as woven fabrics. The yarns running parallel to the length of the fabric are called warp yarns or ends. Those running perpendicular or across to

the warp yarns are called weft yarns or picks or filling yarns. Weaving is done on a machine called a loom. Weaving is the most commonly employed technique of making fabric. Grain indicates the direction of the warp or weft yarns. Lengthwise grain is along the warp yarns. Crosswise grain is along the weft or filling yarn.

ii) **Knitting:** One or more set of yarns are formed into a series of interlocking loops to make the knitted fabric. It is faster than weaving but requires more yarn for a unit cover. It is stretchy and elastic, porous and resilient. A wide range of products such as t-shirts, sweaters, socks, undergarments etc are made through knitting. A single yarn is used for hand knitting. Several yarns may be used to form the loops by the use of hooked needles in knitting machines.

iii) **Lace:** Lace is an open mesh fabric made by intermeshing yarns. The yarns are twisted around each other. The fabric has open spaces between solid fabric areas. It can be made by hand or with machine. Laces are used in making apparel (dresses), home furnishings (pillows, napkins, kerchiefs, table cloth etc).

iv) **Net:** It is an open-mesh fabric that is held together by knots or thermoplastic yarns that are fused at those points, where the yarns cross over. Many types of mesh like square, hexagonal and octagonal shapes are produced. These fabrics are fragile and require care in handling. Products include veils, curtains, sports and equipment.

v) **Braiding:** Braids are narrow fabrics in which yarns are interlaced both in lengthwise and diagonal directions. They are pliable, curve around edges nicely and used basically for decorating the edges (trims). Braids are of two types, flat braids and round braids.

vi) **Crochet:** A crochet is used to make fabric from yarns. The yarn is looped around the needles by wrapping it two to three times. It is possible to make different textures and designs. Products include dollies, table cloths, apparel, home textiles and jewelry.

Macramé: A method of making a textile structure by knotting yarns to form geometric patterns. Products include friendship bands, belts, pot holders, wall hangings etc.

vi) **Coated fabrics:** A fabric is coated with a polymer film like Rubber, PVC (Polyvinyl chloride) and polyurethane. Woven, knit or non-woven fabrics are used as a base. This provides strength and elongation control. The coating protects from water, chemicals, oil and abrasion. Used for upholstery, handbags, window shades, book covers, shoe liners etc.

vii) **Flocked:** Short fibers called flock are held on the fabric surface by mechanical or electronic bonding.

WEAVING

Woven fabric is formed by the interlacement of 2 set of threads, namely warp and weft threads. These threads are interlaced with one another according to the type of weave or design.

Warp threads – Threads that run longitudinally along the length of the fabric.

Weft threads - Threads that run transversely across the fabric.

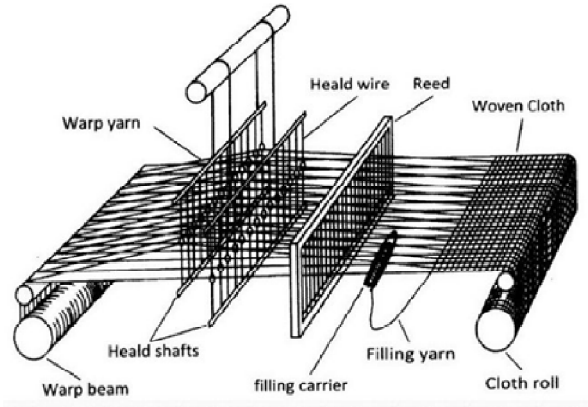
The warp threads are termed as ends and the weft threads are termed as picks or fillings.

Selvedge: When a fabric is examined, two finished edges of the fabric running lengthwise along the fabric can be observed. These are called selvedges (self-edge), which prevent's raveling of threads from the fabric and give strength to the fabric to withstand further processing.

Thread count: Some fabrics may appear dense and closely woven some, will appear open, due to the difference in their thread count. Thread count is the number of warp and weft yarns per square inch. If the thread count is high, the fabric is strong and sturdy.

Weaving process: Weaving is the most common method of fabric construction. woven fabric is formed by the interlacement of 2 set of threads, namely warp and weft threads. These threads are interlaced with one another according to the type of weave or design. In a simple weave construction, a weft yarn goes under one warp yarn and over the next. Weaves are named according to the system of design followed in interlacing warp and weft yarns.

Loom is the machine or device used to produce woven fabric. It is the central point of the whole process of cloth production. The loom is a tool used for weaving yarn and thread into textiles. Looms are made in different sizes.



The basic purpose of a loom is to hold the warp yarns parallel and under tension. Some warp yarns are raised and some remain in the same position, depending on the weave, with the help of Heald shafts. The weft is inserted with a device called "shuttle". Then the weft yarn is beaten with a "reed" (comb like structure). The fabric produced is wound on to a cloth beam. All these activities are manually performed in handloom weaving. A power loom works with electric power.

Types of weaves:

Plain weave: It is the simplest form of weaving. It is reversible with alternate interlacement of warp and weft yarns. It is inexpensive and durable weave. Stripes, checks and plaids are frequently woven in the plain weave. Strong and durable fabrics can be made if the thread count is high. Examples: Muslin, cheese cloth, gingham, lawn, organdie, chiffon, China silk etc. variations created in plain weave are basket weave and rib weave.

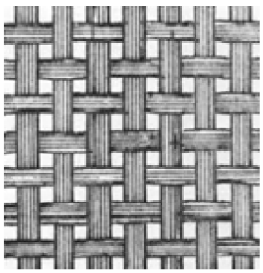


Fig. Plain Weave

Basket weave: It has 2 or more warp threads interlaced as a unit with corresponding weft yarns. This weave gives basket like effect, hence also called as "matt weave". The matt fabric is used for cross stitch embroidery. Other basket weave fabrics

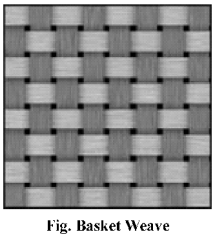


Fig. Basket Weave

available in the market are oxford cloth, monk's cloth, coat and suit fabrics.

Rib weave: Rib or line effect can be created by using heavy yarns in the warp or weft direction. The rib effect can also be obtained by grouping of yarns in specific areas of the warp or weft, or by having more warp yarns than weft yarns. Examples: poplin, ottoman, broad cloth etc.

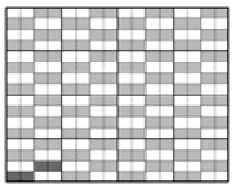


Fig. Rib Weave

Twill weave: It has diagonal lines on the face or back of the fabric. The denim fabric of jeans is made with this weave.They are strong and durable. Warp yarn goes over two filling yarns and under. Twill weave is classified based on direction of the diagonal line as right-handed twill weave and left-handed twill weave. This weave is more expensive and soils less. This weave can be found in men's suits and coat fabrics. Examples: denim, drill, gabardine, tweeds etc.

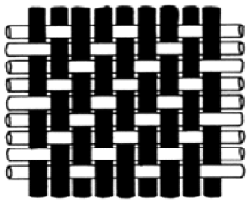


Fig. Twill Weave

Satin weave: This weave will give a shiny, smooth surface as it is woven with long floats. warp yarns float over several weft yarns before interlacing with the weft. Hence, more warp yarns appear on the face of the fabric . If weft floats appear on the face, then it is called sateen. The long floats create shiny surface and reflect light but they tend to snag easily. The satin weave is not as strong as plain or twill weave.

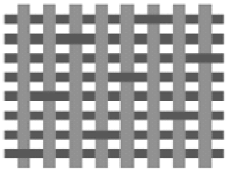


Fig. Satin Weave

Knitting: Knitting is the second important method of production of fabric by forming loops with yarn, which are inter-looped in a variety of ways to form the fabric. Knitted fabrics are stretchable and does not wrinkle. Fits many sizes due to elasticity. Sweaters, socks, hosiery, underwear are made by knitting. Knitted fabrics are suitable for winterwear as the open spaces trap air, providing thermal insulation (prevent heat loss) and warmth.

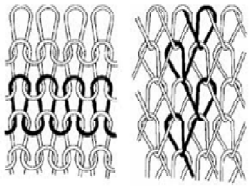


Fig. Courses and Wales

Wales: Vertical rows of loops formed by each individual needle are called wales. They are compared to the warp yarn of woven fabric.

Course: Horizontal rows of successive loops, comparable to the filling yarns of woven fabric.

Count: The total number of wales and courses in a square inch of fabric.

Stitches: Stitches are the loops made by the needles.

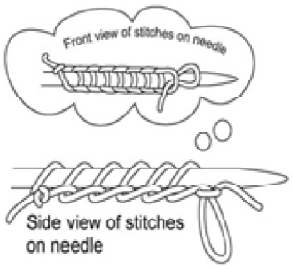
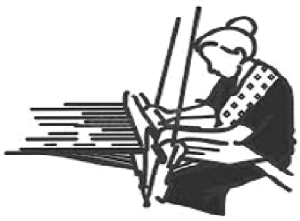
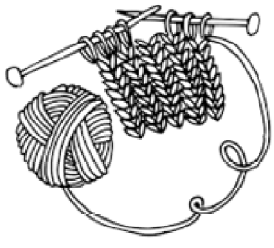


Table 31 Weaving Vs Knitting

S. No.	Weaving	Knitting
1.	Two sets of yarns interlace at right angles.	Only one yarn is interloped.
2.	Loom is the device used for weaving.	Two needles for hand knitting and multiple needles for machine knitting.
3.	The woven fabrics are soft, pliable, in-elastic, wrinkles and creases will appear after wearing and washing.	The knitted fabrics are stretchable, form-fitting, do not wrinkle.
4.	Can be hand or machine washed, need ironing to remove wrinkles.	No need to iron but care should be taken while washing and drying as the garment may sag and go out of shape. Hence, flat dry the knitted garment on a surface, don't hang dry.
5.	Variations in woven fabrics can be created by using combination of weaves, different coloured, textured yarns.	Variations in knitted fabrics can be created by using different types of knitting yarns (texture, colour, thickness) and by combining different knit stitches and colours.
6.	Wide range of products are made with woven fabric, including apparel and home textiles.	Mostly suitable for form-fitting, stretchable garments like underwear, leggings, stockings, socks, T-shirts, sweaters, hosiery etc.
	1 	2 
	3 	4 

INTEXT QUESTIONS

I. Short answer questions

1. Explain about the process of weaving precisely.
2. Explain about knitting briefly.
3. Differentiate between weaving and knitting.

II. Long answer questions

1. Explain about different techniques used for fabric construction precisely.
2. Explain about basic weaves with examples.

EXPERMENT

1. Take a piece of cloth and observe the fabric closely with a magnifying glass. What structure did you observe? Do you think it is a woven fabric or knitted fabric? If woven fabric what kind of interlacement is there? Draw the interlacement and write your conclusion. If it is a knitted fabric, draw the fabric structure.

UNIT - 34

TEXTILE FINISHES

There are huge variety of fabrics available in the market. What factors will you think when you go to buy a fabric? Whether the fabric shrinks or not, can it be washed at home by hand wash or machine wash or needs dry cleaning, does it need ironing, every time after washing, does the colour come out during washing or the dye used is durable etc. If you closely observe the fabrics in the shops, you can read certain terms other than brand names and fabric names, such as was-n-wear (no need to iron) wrinkle free or wrinkle resistant, bleached, preshrunk etc. These are all the preliminary treatments given to a fabric before selling to improve their serviceability and consumer acceptance. These are called "textile finishes".

OBCTIVES: After studying this topic you will be able to

- Understand and explain the meaning and importance of textile finish
- Can classify the finishes based on different factors
- Gain knowledge of types of dyes, their classification and characteristics
- Can explain different stages and types of dyeing and dyeing techniques
- Gain knowledge of printing and different types of printing
- Can explain and show the process of tie & dye and batik

Textile Finish: Finish is anything done to a fiber, yarn or fabric either before or after fabrication to change the appearance, hand and performance of the fabric. Fabrics commercially available in the market are given one or more finishes depending on the end use. Sometimes finishing is also given at yarn stage. All fabrics need to undergo preparatory process that clean and make them ready for receiving color or other finishes. Wide variety in fabrics is possible only with finishing. The amount of finishing depends on the type of fabric used and its end use. For example, cotton fabric used for apparels needs finishes that makes it dimensionally stable, otherwise, if it is used for bed sheet purpose, such finishes are not required. Unfinished fabrics are termed as 'Grey' or 'Greige' fabrics. Natural fibers need more preparatory steps as they contain natural impurities that are to be removed before imparting any functional finish. Man-made and synthetic fibers do not require many preparatory steps as they are clean when manufactured.

Purpose of finishing:

1. To improve the appearance of the fabric (Calendering for lustre, optical brighteners for whiteness).
2. To improve the feel of fabric by softening, stiffening etc.
3. To cover faults in original fabric by starch finishing.
4. To increase the weight of cloth by backfilling with starch, China clay; Stannous chloride treatment for silk.
5. To improve wearing quality of the cloth. Ex: Shrink resistance finish, crease resistant finish, anti-pilling and soil release finish.

6. To make garments hold their shape and wrinkle free. Ex: Durable press finish.

7. To add special properties to the fabric for specific end use. Ex: Water proof finish, flame proof finish, moth proof finish.

Some of the basic finishes are given to almost all fabrics before selling in the market. They are

Types of Textile Finishes: Textile finishes are broadly classified in to three categories **based on their durability.**

1. **Permanent finish:** A finish that lasts throughout the life time of a product.

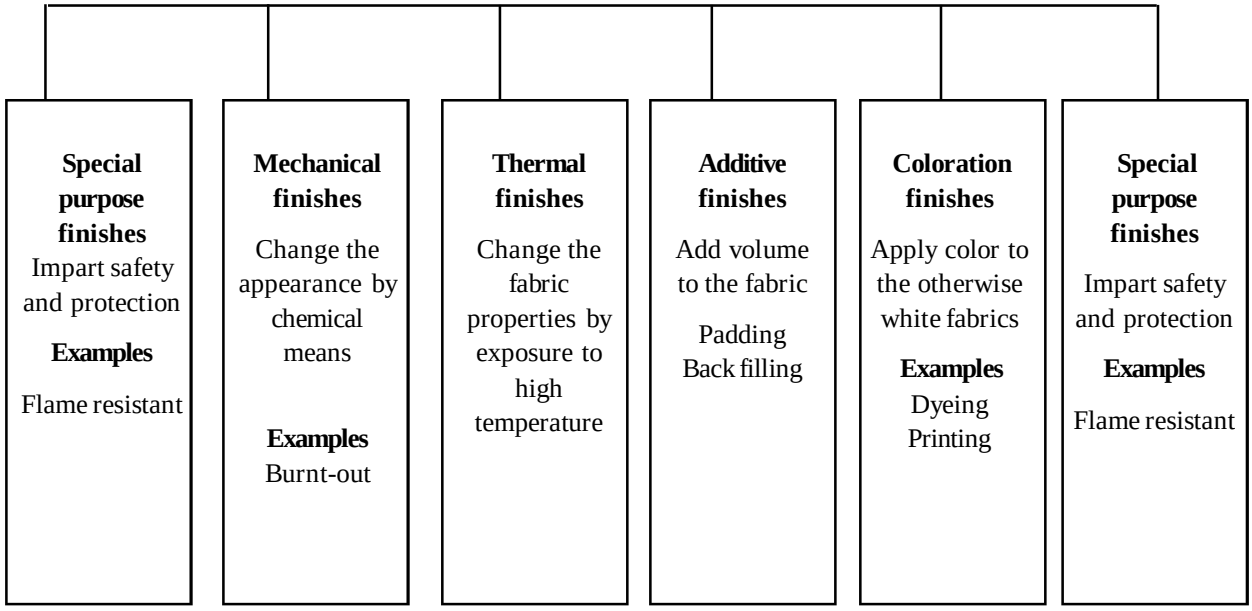
   Ex: Parchmentization etc

2. **Semi durable finish:** A finish that lasts for several washes.

3. **Temporary finish:** A finish that lasts till it is laundered or dry cleaned. Ex: Starching, Calendaring

   Based on the type of treatment, finishes are classified as

Textile Finishes based on Type of Treatment

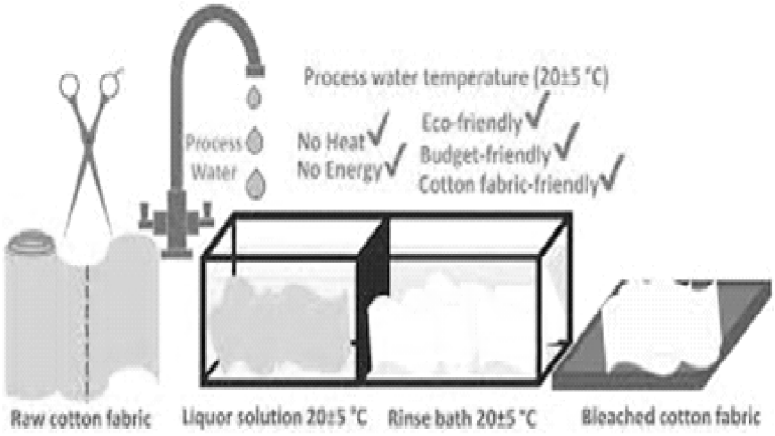


Fundamental characteristics of common finishes:

Basic finishes:

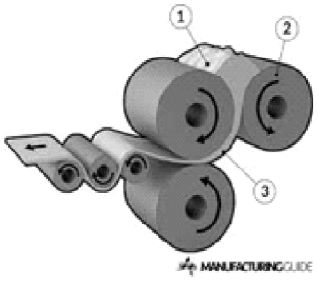
Scouring: Scouring is a general term used to refer to the cleaning, for removal of impurities. Natural fibers contain more impurities such as waxes, gums, plant parts, processing oils and soil. Man-made fabrics generally contain machine oils and other impurities that can be easily washed away. In cotton, the cuticle wax, the leaf and vegetable matter between fibers are removed first by boiling in a detergent solution containing alkali such as sodium hydroxide. The fabrics after scouring are washed thoroughly and subjected to other finishing operations. Bio-scouring uses enzymes to remove the impurities in the fabrics. After scouring, the fabric becomes smooth, neat and more absorbent.

Bleaching: Basic finishes like scouring will make the textile material very absorbent. Some fabrics may still have a yellowish or brownish colour which will affect the tone and brightness of the shade obtained after dyeing. Bleaching is also a basic finish which removes the residual colouring matter from fabrics. Bleaching produces white fabrics by chemical means; hence it is a chemical finish. In the olden days, bleaching was carried out by harsh scouring and exposure to sun. The light served as an oxidizing catalyst. The main objective of bleaching is the removal and destruction of natural and accidentally added colouring matters, thereby making the fabric whiter.



Bleaches can be oxidizing and reducing. Oxidizing bleaches are sodium hypochlorite (Javelle water), sodium perborate and sunlight. Oxidative bleaching agents are much more effective than reducing bleaching agents. Reducing bleaches are sodium hydrosulphite, sodium bisulphate and sodium thiosulphate. Bleaching enhances colour brilliance after dyeing, improves colour uniformity even for darker shades and removes the last traces of residual impurities. However, excessive bleaching will reduce the fabric strength and reduces the durability of the product.

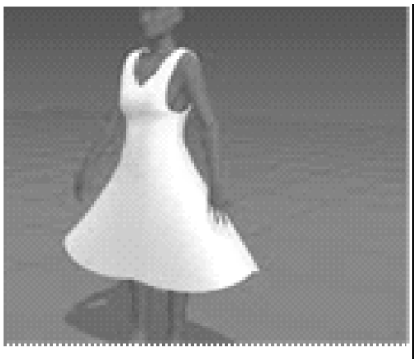
Calendering: Calendering is a mechanical finish, similar to ironing. The Calendering process will flatten yarns, improve lustre, and make the fabric surface smooth. The fabric in open width is passed between two adjacent rollers which are kept under pressure. The fabric is exposed to the combined effect of moisture, heat and pressure. This finish can be applied to cotton, linen, rayon and silk. Surface changes such as embossing, moiré and chintz can also be created by calendering.



Parchmentizing: Crispness of body is given to cotton fabrics by this finish. Parchmentizing uses an acid wash (sulphuric acid) to make cotton fabric, almost transparent, and yet permanently stiff, as in case of organdy fabric. After the acid treatment, the cloth is neutralized in a weak alkali, washed and calendared to improve surface gloss. Commonly found types are, an all over parchmentizing, localized or a plisse effect parchmentizing

Mercerization: The process of treating cotton with concentrated solution of sodium hydroxide is called mercerization. Benefits of mercerization are, increased tensile strength and softness, increased lustre (tension mercerization), improved affinity for dyes by enhancing absorption.

Napping: It is the brushing up of the fibers to loosen them and create a fuzzy finish, to create velvet like effect. Nap can be given on the face or the back of the fabric. It can even be in the form of a design on the fabric surface. It is a mechanical finish. It can improve the durability, hide fabric defects, improves thermal insulation. A napper is a machine that uses cylinders of fine metal wires with small hooks to raise the fibers. Napped fabrics are suitable for winterwear and baby's clothes.



Singeing: 'Singe' means to burn. It is an essential finishing process for cotton and spun yarn fabrics. Singeing makes the fabric surface smooth by burning the protruding fiber ends. This will make the fabric look bright and also improves absorption of dyes. Singeing burns any fiber ends protruding from the surface of the fabric. These protruding ends cause roughness, dullness, and pilling. The fabric is made to pass over an open flame to burn off the protruding fiber ends from the surface. Double singeing is also possible for making both the sides of the fabric smooth.

Stiffening: To give a fresh look to the garments, they are given a crisp or stiffened appearance by treating them with stiffening agents. It is also called as starching, in common usage, even though the stiffening agent may not be starch. A certain amount of stiffness in the washed clothes gives them a smooth glossy surface which is resistant to dirt and dust. Benefits of stiffening are, it gives a crispness to the fabric and makes it neat in appearance. Stiffening keeps the clothes clean for a longer time by holding down the surface fibers that hold the dirt and dust. The stiffness, however, must not compromise the pliability of the garment too much.

Special purpose finishes:

Water repellent: A water repellent finish resists wetting, but if water strikes with enough force, it will penetrate the fabric. A water proof fabric will not get wet regardless of the time and amount of pressure applied. Chemicals used for water repellent finish are fluorocarbons, wax emulsions, metallic soaps, surface active agents.

Fig. Water repellent fabric

Wash-n-wear: This finish makes the fabrics easy to care for. The time used for laundering and pressing is minimized. Durable press finish describes a product that retains its shape and pressed appearance even after several washes. It is applied at the fabric stage; it is also applied to the garments.

Flame-retardant finish: These finishes block the flame from spreading. They may also emit a fame extinguishing gas. Phosphate compounds, salts or halogenated organic compounds or inorganic compounds are used to produce durable flame-retardant finish.

Selling faulty or defective goods : Many sellers of ready-made garments and home textiles, sell export rejects, known as "seconds" which are either damaged, or of inferior quality for a lesser price. Did you see the news paper advertisements about selling expensive clothing having minute defects, at throw away prices? This is a common cheating practice.

IN TEXT QUESTIONS

I. Short answer questions

1. Write precisely about special purpose finishes.
2. Write a short note on purpose of textile finishes.

II. Long answer questions

1. Discuss in detail about basic finishes.
2. Classify the textile finishes based on durability and type of finish with a flow chart. Give examples.

EXPERIMENTS

1. Take corn or rice powder. Add water, make a paste and boil. Take two fabrics. Dip one fabric in the paste, soak for 30 mins. and dry. Soak the second sample in water for 30 mins and dry it. Now observe the samples. What difference did you observe? Note down. What is the name of the finish you have applied?
2. Take two new fabric samples of 5cmx5cm size. Soak one fabric sample overnight in water. Leave the second sample as it is. Squeeze out water from the first sample and dry it. Now take measurements of both the samples. Did you notice any change the measurements of the first sample? Is there a decrease or increase in the measurements? What is the process happened? Write down your conclusion.

UNIT - 35

DYEING AND PRINTING OF TEXTILES

The final stage of finishing of white fabrics, after applying all preliminary finishes is, dyeing or printing. Most of the fabrics undergo dyeing or printing finishes as they improve the aesthetic appearance and enhance consumer acceptance of the fabric. A huge variety of colours, shades of fabrics are available in the market with different visual effects, which are possible due to different techniques of dyeing used.

Dyes are natural or synthetic substances that add colour to the fiber, yarns and fabrics. Dyes may combine chemically with fiber molecules, attach themselves to the fiber surface, or be absorbed in to the fiber without the chemical action. Dyes are responsible for the colour of the dye and printed textile fiber materials. Dye is a compound that can be fixed on a substance permanently, and gives the visual sensation of a specific colour.

Dyeing: Dye molecules are colored because they selectively absorb and reflect some of the wavelengths of the light falling upon them. When all the visible light rays are reflected, it appears black. When all the visible light rays are absorbed, it appears white. When one or more rays are reflected, the viewer senses the colour produced by the specific reflected ray or combination of rays. Dyes are organic molecules, which are made up of components called chromophores and auxochromes. The chromophores give the dye molecule its particular colour, while the auxochromes intensify the colour, and make the dye molecule water soluble.

Types of dyes used for finishing of textiles:

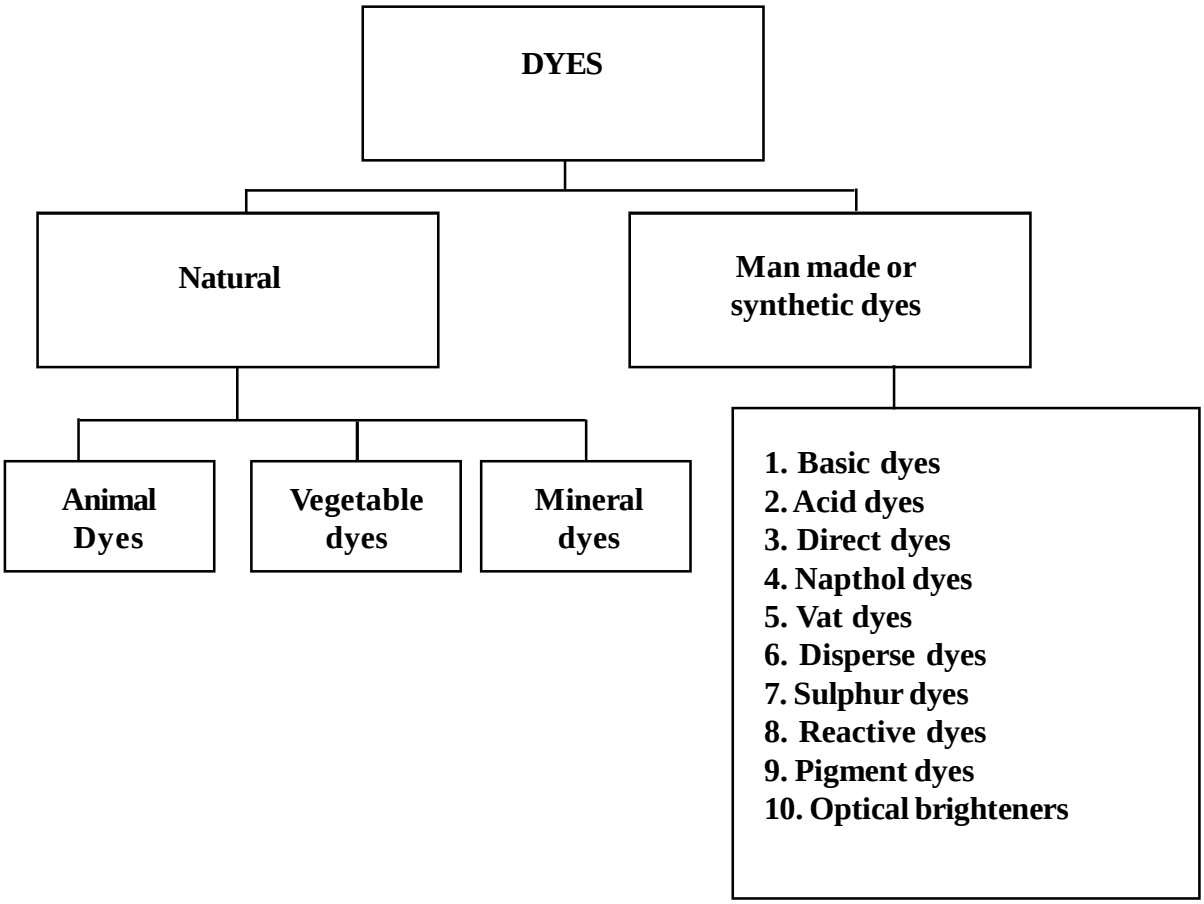
Textiles can be dyed in different forms. Before dyeing, a proper selection of a dye must be made. The dyer must consider quality of fiber, yarn, weave, finishing process and suitability of dye to various uses. All dyes cannot be expected to last permanently in all conditions (colour fast), such as sweating (perspiration), washing or sunlight.

The selection of dyes of a particular class depends up on various factors such as

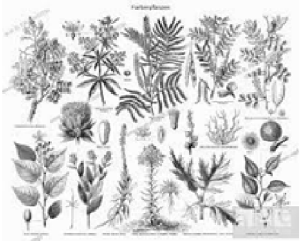
- Cost of dyeing,
- Availability of the required shades,
- Fastness or permanency of dyed materials,
- Brightness of shades,
- Ease of dyeing.

Classification of dyes:

According to the source from which the dyes are obtained, the dyes are classified as follows:



Natural dyes: Until 1856 (invention of synthetic dyes), natural dyes and pigments were used as colouring agents. These were obtained from plants, insects, and minerals. India has a great heritage of using natural colouring materials, their production and application. It is evident from the literature that around 500 plants can give raise to natural colours. Few animal and mineral sources were also known to produce very striking colours. Natural dyes are extracted from the roots, stems, leaves, flowers and fruits of various plants and dried bodies of certain insects and minerals. Based on the source of the dye, the natural dyes are further classified as



A) Vegetable dyes: These dyes are extracted from the roots, stems, leaves, flowers and fruits of various plants. Some of the vegetable dyes are Madder, a red dye (from the roots of Rubia tinctorium plant), has been used for producing purple and brown and even red shades on cotton and wool, Indigo (from the leaves of Indigofera tinctoria plant) which yields blue colour, yellow from the stigmata of the saffron plant, Logwood, obtained from the pulp of the logwood tree grown in central American states and West Indies is widely used for dyeing silks in blacks. Natural dyes from sources such as seeds, roots, gum etc. are also used for dyeing

textiles. These sources give colours such as orange, brown, green etc.

B) Animal dyes: Dried bodies of certain insects give colouring materials, known as animal dyes. Good examples of animal dyes are cochineal, a brilliant red dye produced from insects known as Coccus cacti. Kermes,cochineals and lac come in the market in the form of little dark coloured grains which, when ground up in hot water, gives a red solution called carmine. Kermes consists of dried bodies of insects which lives on a species of oak. Lac also gives red colour. The dye is obtained from the body of a small insect called Coccus lacca. Tyrian purple is another dye obtained from mollusks. It is very expensive, as 12,000 animals were needed to obtain one gram of dye stuff.

C) Mineral dyes: These include various metal salts and metal oxides. Minerals provide such dyes as Prussian blue, chrome yellow, and iron buff. Tribes and nations in different parts of the world have found out the art of colouring and staining textiles with mineral compounds.

Iron buff **-** iron springs, containing iron salts in solution are found in many countries with colour sediments left when the water stands exposed to the air. Dipping clothes in these springs and then exposing them to the air dyed them in iron rust colour commonly called as" iron buff".

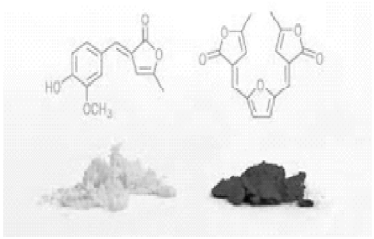
Mineral khaki, a mineral colouring matter has been used to dye military uniforms.

Synthetic dyes:

Synthetic dyes were first derived from **coal tar** in 1856. The synthetic dyes are constantly being improved to increase the beauty of colour and to enhance colour fastness. They are mostly accepted because of their bright colours, fastness properties and ease of some of the synthetic dyes are hazardous to environment and toxic to humans.

The classification of the synthetic dyes based on the particular type of chemical composition/method of application of the dye is as follows. **Table 31 Classification of Synthetic Dyes :**

1.	Basic dyes	6.	Disperse dyes
2.	Acid dyes	7.	Sulphur dyes
3.	Direct dyes	8.	Reactive dyes
4.	Naphthol dyes	9.	Pigment dyes
5.	Vat dyes	10.	Optical brighteners

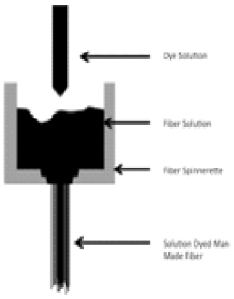


Application of dyes:

The dyes are applied not only on fabrics, but also on fibers, yarns and sewing threads etc. Dyeing can be done at different stages of textile manufacturing including :-

Fiber stage dyeing (solution/dope/ pigment dyeing): Dyeing at fiber stage is more common for man-made fibers. The dye or pigment is added to the spinning solution before the extraction of filaments/ fibers through the spinnerets. In this method, the addition of dye or pigment to the spinning solution

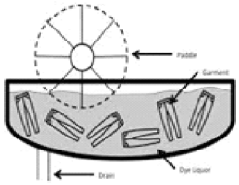
before it is forced through the spinnerets takes place. The liquid spinning solution is sometimes called as fiber dope. Hence, the term "dope dyeing". The colour becomes part of the fiber itself, and is thus permanent. Other methods of fiber dyeing include gel dyeing, chip dyeing, stock dyeing, top and tow dyeing.



Yarn stage dyeing: Yarn dyeing is done after the fiber has been spun into yarn. In this process yarns are immersed in a dye bath before they are made into fabric. There are several methods of yarn dyeing used, such as package dyeing, skein dyeing, warp beam dyeing and space dyeing, but the purpose is to have the dyestuff penetrate to the fibers in the core of the yarn. Yarn dyed fabrics are usually deeper and richer in colour. The primary reason for dyeing in the yarn form is to create interesting checks, stripes, muted, solid, iridescent and plaids with different colored yarns in the weaving process. Yarns are dyed not only for weaving, but also other purposes such as for knitting, embroidery, sewing threads etc.

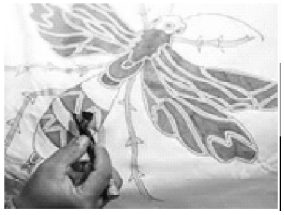
Fabric stage dyeing (piece dyeing): Piece dyeing involves dyeing fabrics "in the piece," rather than dyeing stock or yarn. The great bulk of dyed fabric in the market is dyed in piece. This method gives manufacturers maximum flexibility to meet large or small demands for a given colour as fashion requires. Specific names such as union, cross, tone-on-tone and reserve dyeing are given to piece dyeing of fabrics containing fibers that exhibit different dyeing characteristics. Vacuum impregnation, foam dyeing and solvent dyeing are the latest technologies developed for dyeing at fabric stage.

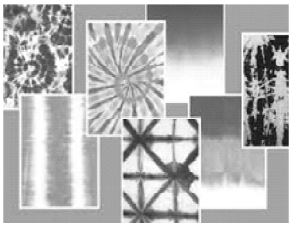
Garment stage dyeing: Certain kinds of non-tailored garments, such as hosiery, pantyhose and sweaters can be dyed as completed garments because they are each made of a single component and will not be readily distorted. However, allowance must be made for expected shrinkage. A number of garments are loosely packed into a large nylon net bag. The bags are then put into paddle dyer, which is a tub with a motor driven paddle that agitates the dye bath. This method of dyeing is economical, as small quantities of garments can be dyed.



Resist or decorative dyeing:

Dyeing textiles at different stages of manufacturing, with solid colours is discussed above. There are certain specific methods of dyeing done to create decorative effects by preventing some areas of fabric or yarn from absorbing dye, known as resist dyeing. In these methods, certain resist materials are used, such as wax, threads, yarns etc. The most common resist dyeing methods are Batik and Tie & Dye.



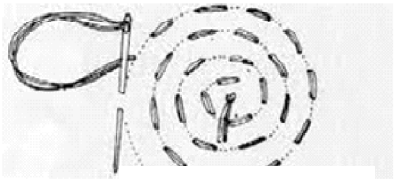


Batik: It is a resist dyeing process in which the wax is the resist material used. The design is traced on the fabric to be dyed. Then bees wax is applied with special brushes on both the sides of the fabric, as per the design. The fabric is immersed in cold water

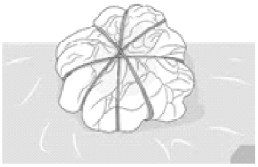
and then dipped in to dye bath. The portion of the fabric that is not covered by the wax will absorb the dye and the rest of the cloth serves as a resist. After the dyed fabric is dried, it is rinsed and boiled in hot water to remove the wax. A typical batik is characterized by crackled design with no precise out line. The crackled effect gives a delicate cob-web like lines on the design.

Tie & Dye: Tie and dye is practiced since 16th century in India especially in Rajasthan and Gujarat. Materials suitable for tie and dye are georgette, lawn, cambric, poplin, khaddar, silk, nylon, mulmul. Both new as well as used materials can be given a new look by means of applying fresh colours and designs. This is a resist method of dyeing in which, fabric or yarn is tied with special thread and rubber band to resist dye penetration on the tied areas. Tie and dye is a hand process in which yarn or fabric is wrapped in certain areas with fine threads or strings and then dyed. There are many techniques used in tie & dye to create designs. A few methods are discussed below

Tritic: For any design, draw design on fabric and make tiny running stitches along the traced out-line. Then pull the thread tightly and fasten it.

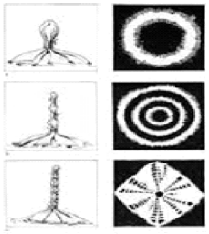


Marbling: Crumble the fabric with hand in to a ball. Tie the fabric ball with a yarn or thread randomly and secure the ends. Then dye the fabric. When the dyed fabric is opened by removing the thread, marble effect can be noticed in certain areas.



Knotting: Knotting the corners, center and any desired area of the fabric before dyeing creates interesting circular designs.

Bundling: The fabric is pleated horizontally and vertically and then tie with a thread at regular intervals, and then dyed.



Spiderweb: The center of the fabric is picked, to form a cone shape, then the fabric is tied at regular intervals to create beautiful circular webs.

Bandhani: To obtain a mango design, draw a dotted mango design. The distance between the dots may be as desired but should not exceed ¾ inch. The lesser the distance between the dots the better the effect. Pick each dot with the help of your fingers or finger nail and knot the area with the thread. Tying is done either with a continuous thread or thread is cut after each spot is tied. The threads to tie dots should always be white.

Printing:

Printing is a method of applying colour on fabrics in the form of localized or all over designs. The major difference between dyeing and printing is, dyeing can be done at fiber, yarn, fabric and garment stage but printing is done on the fabric only. There are different principles involved in applying prints on fabric based on the visual effect required. They are

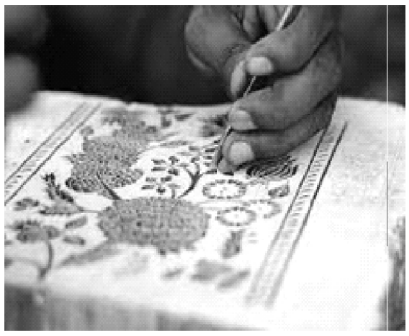
Direct printing

Discharge printing

Resist printing

Direct printing: Direct printing has been the most common method of applying design to fabric. In

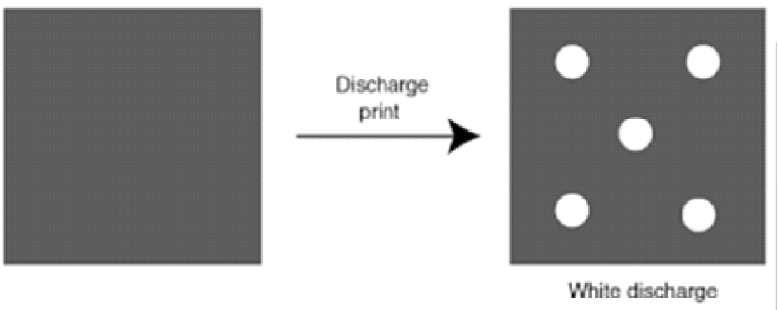
direct printing, the design is printed directly onto a white cloth (or) over a previously dyed fabric. In case of the dyed fabric, it is called the overprint. These overprints are usually done to cover defects. The printed design must be considerably darker than the dyed background. The techniques used for direct printing are block printing, roller printing, duplex printing and photographic printing. As block printing and screen printing are the most commonly used direct printing methods, they are discussed in detail here below.



Block printing: The oldest and simplest method of printing designs on fabric is block printing by hand. It was practiced by Chinese and Indians 2000 years ago. Each block prints only one colour. So, if a design of several colours is desired, blocks must be made for each colour. The blocks which are used for printing are made of wood or metal. The design to be printed is carved or raised on thick block of wood. So, in preparing a block- the design area remains raised while the background is carved away. The fabric is first laid flat on a padded table. The printing paste is applied on the raised areas of the block. The block is pressed down firmly by hand on selected portions of the fabric, forcing colour in to the surface.

Screen printing: Screen printing is a method of direct printing, where by a closely meshed screen, mounted in a wooden or metal frame is kept over the fabric to be printed, and the print paste forced through the screen by a squeegee. This technique is referred to as silk screen printing because the screens were made of strong silk threads. originally flat screen printing is done by hands but now-a-days it is also done by machine. This method gives more cleaner, brighter colours and prints.

Discharge printing: Discharge Prints are fabrics which are dyed prior to printing. Many pleasing effects can be obtained by producing coloured patterns on coloured fabrics or by producing a white pattern on a coloured fabric. Discharge prints are Prints that have a dark background, widely spaced motifs, and a rich, vibrant, expensive look. For the fabrics to be discharge Printed, the fabric is first piece dyed. A discharge Paste which contains chemicals (discharging agent) to remove the colour on the fabric is then applied to fabric with rollers. A great advantage of discharge printing is that a white (or) coloured pattern can be produced on dyed backgrounds.



Resist Printing: Resist printing is one of the oldest methods of applying design. Early Javanese & Japanese stencil Prints are examples of resist printing. Batik prints are example of resists prints. Resist Prints involves two different techniques. They are Printing

Printing: It has a pattern cutout in a stencil or screen to pass the print paste to penetrate onto the fabric. Different types of resist printing methods are used such as, Stencil and screen printing.

Piece Dyeing: The fabric is first printed with a resist material like resin or wax, which will prevent or resist the penetration of dyes and then dyed. Another technique is, tiny Puffs of fabric will be pulled over a pointed object, and waxed thread is tied tightly below the small puff. Whenever the fabric has to resist the colour, it is tied securely with the waxed thread. After tying (or) printing the desired design with wax, the fabric will be dipped into a dye bath. The fabric resists the dye penetration in the specified areas. After the fabric has passed through a subsequent dyeing process, the resist paste is removed.

INTEXT QUESTIONS

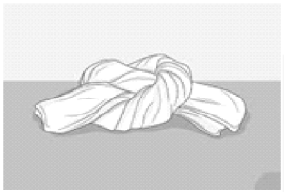
I. Short answer questions

1. What is dyeing? Write in brief.
2. Classify natural dyes with examples.
3. Explain about dope dyeing.
4. What is discharge printing?
5. Explain about batik precisely.

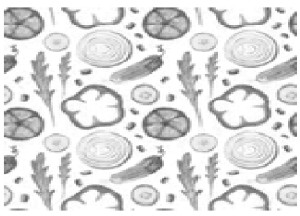
II. Long answer questions

1. Classify natural dyes with examples.
2. Explain about different stages of dyeing.
3. Discuss about tie & dye technique of dyeing in detail.
4. Explain about various types of printing.

EXPERIMENTS



1. Take a 10cmx10cm white cloth, remove starch by soaking overnight, dry it and iron it to remove wrinkles. Now knot the fabric in four corners. Dissolve Holi colour powder or rangoli colur powder in a mug of water. Immerse the knotted fabric in the mug for one hour. Don't open the knot, squeeze the water gently and dry it. Remove the knots after the fabric completely dries. Now observe the fabric. What design did you observe? Will you try other techniques of tie & dye at home?



2. Cut potato into two halves. Try to carve simple flower or leaf design on the potato. Now prepared take any one poster colour or acrylic paint in a palette. Keep a white fabric ready. Dip the potato block in paint and stamp it on the fabric. Likewise, you can cut onion in to half and use it as block. Many vegetable pieces like, bhindi, carrot, cucumber can be used for block printing. What is your observation? You can make beautiful prints on hand kerchiefs, dupattas or table cloths using same technique with fabric paints.

MODULE VIII
TEXTILES & CLOTHING SELECTION AND CARE

UNIT - 36

SELECTION OF TEXTILES AND CARE OF CLOTHING

You have learnt about textile fibers, yarns and fabrics in the previous lessons. You also know that the fiber and yarn properties have great influence on fabric performance. Certain textile fibers are given as preparatory processes to make the fabric suitable for marketing, whereas some special purpose finishes are given to specific properties to the fabrics. Now you have some knowledge of which fabrics are strong and durable, which fabrics are suitable for particular seasons and why.

However, to assess the fabric quality and suitability, you need to understand the information given on a bolt or than of fabric in a shop before purchasing. The information printed on the "than" explains the fibers used to make the fabric, the finishes given if any, the thread count of the fabric etc. in case of ready to wear garments, labels are attached to the garment at specific places to inform the consumer about the fiber content, special finishes given, care to be taken in laundry etc. to guide in making right choice, suitable to the consumer's need.

SELECTION OF FABRICS FOR DIFFERENT END USES: Different types of fabrics are used for different purposes in a home, depending on their properties. For example, door mat fabrics are different from table cloth fabrics and bath towel qualities are different from blankets. The fabrics used for different end use have different properties, enhancing their suitability, which in turn is dependent on the fibers, yarns, weave or specific fabric construction technique used and finishes given.

You have already studied the fiber properties, and end uses in the first topic. If you can recollect, the important properties are

Fiber properties:

Length and appearance of the fiber:

Do you remember filament and staple fibers? The textile fibers are classified based on the length of the fiber in to staple and filament fibers. Short fibers are staple fibers, examples are cotton, jute, linen etc. long fibers are filament fibers, examples are synthetic fibers such as nylon, polyester, acrylic etc. the length of the fiber has an impact on selection of fabrics. Short, staple fibers appear dull and rough in texture and get soiled easily, whereas filament fibers are smooth, lustrous and do not get soiled easily. Hence, if you need lustrous, shiny smooth fabric, its better to select fabrics made of long filament fibers. Some finishes may be applied to improve the dull appearance by applying finishes such as stiffening, and mercerization for cotton. Only mercerization improves the appearance and lustre permanently. Stiffening is not permanent. Hence, you must read the information about finishes given to the fabric, printed in the "than" to make a wise choice.

Moisture Absorption:

This property is the ability of the fiber to absorb moisture. This is very important factor, which effects the comfort to the wearer. If you are wearing polyester or nylon clothes in hot summer, how do you feel? Will be comfortable or not? You feel great discomfort, sweat. Is it not, correct? Because polyester or nylon moisture absorption ability are much less than cotton. that's why we prefer to wear cotton clothes in summer. Hence, the moisture absorption property of a fiber has a great influence on wearer's comfort. You must consider this property while selecting clothing for a particular season.

Heat Conductivity:

This is another important property of fibers, which impacts selection of winter clothing. In winter your body loses body heat at a fast rate. Hence you need clothing that keeps you warm and prevents heat loss. Fiber like wool, acrylic provide warmth due to high heat conductivity than other fibers, as they have wavy structure, giving thermal insulation property. Insulators will not allow heat to pass. The knitted fabrics also hold air pockets in the tiny spaces between the yarns, providing thermal insulation.

Strength:

Can you recollect which fiber has high strength? Which fiber has low strength? Cotton and synthetic fiber like nylon have high strength. Some fibers like wool, silk, rayon become week when wet. Whereas cotton gains strength when wet. This property is important, because, we frequently wash our clothes. The fibers should withstand the pressure exerted during washing. Fabrics like cotton, synthetics are strong, most suitable for daily wear clothing, as they can withstand every day washing. Where as fiber such as wool, silk loose strength when wet, hence not suitable for frequent washing, need dry cleaning. Hence, they should be selected for partywear or occasional wear. Nylon is the strongest fiber, used for industrial purposes, parachutes, ropes and fish nets.

Fabric construction techniques:

You have learnt about different techniques used for fabric construction. Though woven fabrics are the most commonly found in market, many other methods are used to make fabric, like knitting, crocheting, macrame, braiding, felting, foaming, thermal bonding etc. Knitted fabrics are commonly found in undergarments, socks, stockings, jackets, sweaters etc. Woven fabrics are commonly used for regular wear apparel and home textiles. The Turkish bath towels, velvet cushion covers, absorbent kitchen napkins, light weight, sheer lace curtains, damask sofa covers, denim trousers, satin frocks and georgette saris etc. are all made with different types of weaves. Each method of construction gives unique properties to the fabric, suitability to specific end use. Hence, based on the knowledge of fabric construction, you should select the fabric to best suit your need.

Textile finishes:

You have studied about different textile finishes and their purpose in previous chapter. The textile finishes given to the fabric enhance the aesthetic appeal and functionality of fabrics. Generally, if we need 2 meters of fabric, we tend to buy a little more, assuming the fabric will shrink. If you buy a wash-n-wear or permanent-press fabric, which is resistant to shrinking, you can save your money by purchasing exact quantity of fabric required.

However, sometimes finishes are also given to cover the faulty areas of the fabric. You will learn more about faulty practices, in next chapter. Hence, it is necessary to assess the fabric quality before buying.

INTEXT QUESTIONS

I. Short answer questions

1. Explain about the impact of fabric construction techniques on fabric selection precisely.
2. List the fabric properties that influence fabric selection.

II. Long answer questions

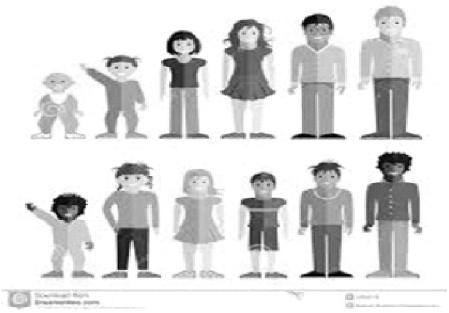
1. Discuss about the role of fabric properties in fabric selection.
2. Explain about the factors effecting fabric choices precisely.

FACTORS INFLUENCING SELCTION OF CLOTHING

How frequently will you purchase clothing? What are the occasions you buy clothing for? Will you buy any clothing you like or you buy after thinking and checking your requirement and suitability of the clothing? Yes. There are many factors that we consider before buying clothing, which have a great impact on our clothing choices. They are discussed below.

Age:

Did you observe that clothing a person wears, changes with age? Even if the clothing fits, you will not wear the clothing of adolescence during your adult age or old age, because your tastes will change, occupation, social status, everything changes, as you grow. Different age groups require different types of clothing and fabrics.



Clothing for the Infants:

Infants will have sensitive skin. Hence the clothing should be soft, lightweight, simple without much trimmings and buttons, which might press against the baby's skin. Hence for infant clothing, important considerations are comfort, easy to wear, extra allowance for growth and easy to maintain features. Safety is very important factor for infant's clothing. No draw strings at the neck, as they may suffocate the baby, no buttons or other decorative items, which the baby may swallow. The clothing should provide warmth to the baby and protect from winds and chills. Babies sleep most of the time, hence the clothing should be simple and easy to put on and take off. Babies may drool or vomit hence, the clothing should be easy to wash, should include bibs for protecting the clothing. The diapers should be made of absorbent material and must be changed frequently.

Clothing for the Toddlers and Children:

Toddlers and children's clothing should be lightweight, comfortable, easy to wear. As the toddlers quickly grow out of their size, allowances for growth are must. Toddlers and children play a lot and soil their clothing. Hence durable, washable and easy to maintain fabrics should be selected. The fabrics should be of smooth texture and resist soil.

Clothing for Later Teenagers and Adolescents:

The college going teenagers are very conscious about their self-image and the clothes they wear. The important factors to be considered for adolescent clothing are extra allowance for growth, lot of variety in colour and clothing, as most adolescents want to dress to keep up with their peers, the clothing should be creative, stylish and designed according to the current fashion trends. Adults clothing require

comfort, quality and elegance. Mix and match clothing are advisable to create variety in clothing. Couple of pairs of jeans can be paired up with many tops or t-shirts. The same goes for skirts also.

Clothing for adults:

The selection of clothing for adults is influenced by their occupation and social status. People of different occupations require different types of clothing. The needs of a working women are different form a home maker. She needs easy to care, wrinkle free clothing, which may be frequently washed without much ironing.

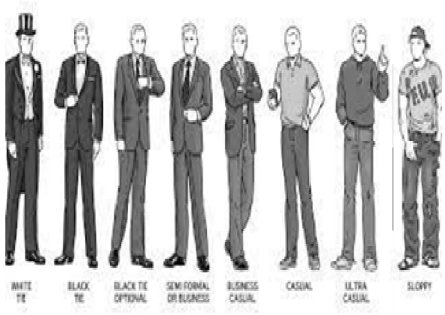
Clothing for Old Age:

Old age brings many physical and physiological changes. The body becomes stiff, skin wrinkles and folds appear, skin becomes sensitive to cold and hot. Their joints may become stiff, restricting movements, spine may bend and abdomen and hips size increase. They need comfortable clothing with special functional features to make it easy to wear and maintain. Comfortable, light weight clothing is of priority with minimal fashion features. Certain functional features like elasticated pants, wrap around skirts, upper garments with front openings, Velcro closures in place of buttons and hooks, large neck lines to make it easy to wear, large sleeves, non-restrictive sleeve types like raglan, kimono are preferable. The clothing should also meet the psychological needs of the elderly.

Occupation:

Can you identify a doctor, nurse, police and fire fighters immediately? How? You can identify certain professions by the uniforms they wear. Depending on the job specifications, the dress will vary in its requirements. Army people wear durable clothing and sturdy footwear. Certain colors are specific to certain occupations. Doctors and other health care professionals generally wear white colored uniforms. Worldwide, black gowns and white shirts are the clothing worn in legal profession. Khaki is generally worn colour by police in India. Even if an occupation doesn't require a uniform, most of the work places adopt wearing formal clothing and grooming as accepted norms.

Occasion:



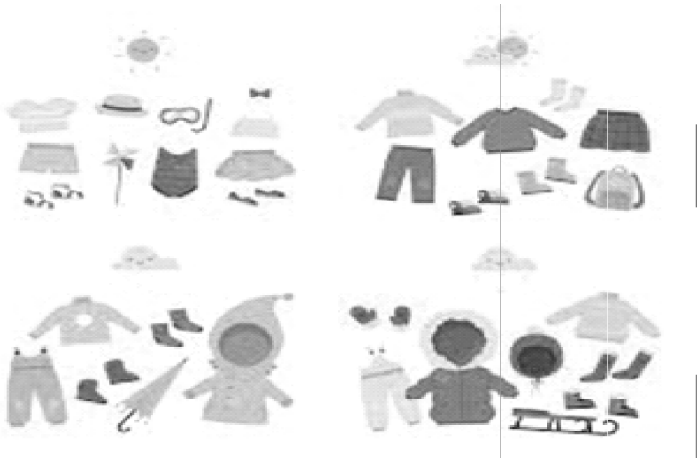
Each occasion demands a particular type of clothing. Bright, colorful, shiny, decorated clothing are generally worn during special occasions such as weddings, festivals and other functions. Sober, dull, subtle colored dresses are worn for funerals and during mourning. Different types of sportswear is worn for different sports. The specific requirements for sports clothing are durability, stretchability and absorbency. When attending meetings or formal occasions you need clean, wrinkle-free clothes. While travelling also you need wrinke-resistant and soil resisitant clothing.

Fashion:

Fashion is the most accepted style by a large group of people, at a particular time. Fashion keeps changing continuously and changes with your style of living. A "fad" is the fashion which is short-lived. Teenagers and adolescent generally follow the fashion closely. A significant amount of their money is spent on buying fashionable clothing and accessories. They discard the clothing quickly and keep buying new clothes according to the changing fashion trends. However, simple, inexpensive, durable fashion clothes with trendy colours, textures and styles should be selected. Though teenagers want to follow current trends closely, they should consider the suitability of the clothing to their figure, instead of blindly adopting the fashion.

Climate:

The selection of clothing is greatly influenced by climate. Whether you are living in a cool climate or warm climate determines your clothing choices. In regions having cold climate, you need to select thick, warm clothing with good thermal insulation properties should be selected to keep you warm. Whereas for warm regions, you should select soft, light weight, clothing with good air permeability, absorbency and good thermal conductivity to keep you cool. In coastal areas the climate will be humid and wet. For such climate you need to select clothing that is absorbent, easy to dry, stain resistant and permeable.



INTEXT QUESTIONS

I. Short answer questions

1. List the factors impacting clothing selection.
2. Explain about clothing selection for different age groups

II. Long answer questions

1. Explain about the various factors influencing clothing selection.

EXPERIMENT:

Find out the clothing preferences of your family members. Ask them what factors influence them most, while buying clothes.

UNIT - 37

CARE AND MAINTEINANCE OF CLOTHING

What happens when you wear a dress for the whole day? It will get wrinkles, gets oiled, if you are not careful, may get stained also. Hence, it is necessary to wash your clothes, iron them regularly for neat appearance. You should clean and wash the other clothing items used in your home, known as home textiles also regularly, in order to maintain a clean environment. If you don't clean textiles, bacteria and fungus may grow on the clothing and other textiles, giving bad smells, discoloration or yellowing, and gradually the fabric will get damaged and loses its strength. The process of removing stains, cleaning, washing and ironing is known as care and maintenance of clothing.

Will you wash and iron delicate silks, cottons and woolens in the same way? You know that each fiber has different properties, and each fabric may be given different finish. Hence, the methods of washing followed are different for each fabric. Some fabrics like cotton, can withstand high temperature, whereas some fabrics like silk need to be handled carefully, only cold water should be used. For some clothes we use strong detergents, bleaching agents, for some we use only mid soaps or we give for dry cleaning. Hence, it is necessary to understand how to take care of different types of fabrics, and maintain them.

CARE AND MAINTENANCE OF CLOTHING:

Need for taking care of clothes:

You know that most of the textile fibers have high strength hence, they are durable. They are also expensive. If proper care is taken, they can last for a long time. As explained earlier, different fabrics are made of different fibers, having different properties, hence need specific care suitable to the particular fabric. All the activities involved in care and maintenance of fabrics such as mending tears, removing stains, choosing the right soap or detergent, method of washing to proper storing require careful consideration, as these activities effect the durability or life of the fabric.

Laundering is the term that refers to the process of removing both dirt and stain from the fabric, to improve its aesthetics and performance.

What is dirt? Dirt is the term that applies to grease, grime and dust, which are jammed between the fibers, which may be loosely attached to the fabric surface or fixed. Loose dirt can be easily brushed off or shaken off. Whereas fixed dirt is held by grease and can only be removed with the help of detergents or solvents.

What is a stain? Stain is a mark of discoloration on fabric, which may be either absorbed or held between the fibers.

You may think "laundering" means only washing of clothes. But laundering includes washing, proper drying and finishing.

Laundering = washing +drying+ finishing of clothes

Dry cleaning: Some clothes cannot be washed. They need to be cleaned with suitable solvents or grease absorbents. They are cleaned without the use of water, which may damage the fabric or colour of the fabric.

Sorting: The clothes should be sorted before washing, according to their colour, texture, amount of dirt and type of fiber. Separate whites and coloured garments. Wash extremely dirty clothes separately.

Stain Removal: If there are any marks or discoloration other than dirt, they should be removed before washing, as they may spread to other areas. The stain removal techniques are discussed in detail under the stain removal topic.

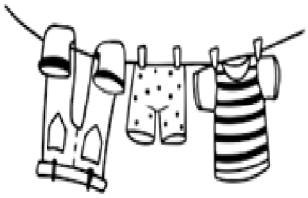
Soaking: Why do you soak clothes before washing? Soaking loosens the dirt from the fabric and helps in easy washing. All fabrics should not be soaked, for example fabrics with dark colours, which are not fast can not be soaked for long time, as they may fade out or spread to other fabrics. Woolen fabrics also should not be soaked as the fibers may mat and felt together. While soaking, care must be taken to dissolve the detergent completely to avoid wastage. Don't pack the clothes too tightly. Garments can be soaked for minimum of half an hour and maximum for 3-4 hours. Don't soak clothes overnight.

Washing: Now wash the clothes using appropriate detergents, and also most sutiable method of washing.

Rinsing: After washing, the detergents, soaps or auxiliaries used must be completely removed from the fabric. Otherwise, if left without proper rinsing, they will damage the fabrics. The clothes must be rinsed in clean water 3-4 times or until the water runs clean without any traces of soap.

Starching and or bluing: After removing the traces of soap, the clothes must be starched, if they need the body and neat appearance. If the clothes are white, then blue also should be applied along with starch to retain the whiteness.

Drying: Did you observe how drying of clothes is done? Different fabrics are dyed in different ways. White clothes are dried in sunlight and coloured clothes are dried under shade. Can you tell why? Because if the colours are not fast to sunlight, they may fade out. Among the different types of fabrics, silk fabrics, even if white or coloured are generally dried in shade and synthetics are also dried in shade. Wool is dried in shade, spread on a flat surface or on floor. Other then cotton, most of the fibers are dried in shade as harsh sunlight may damage the fiber.



Ironing and Pressing: This is the final step of laundering. Based on the nature of the fiber, the ironing temperatures vary. Cotton can withstand high temperature. where as delicate fabrics like silks and synthetics require very low temperature for ironing. Thermoplastic fibers may be permanently deformed at high temperatures. Some water is sprinkled on cotton clothes to remove wrinkles. Woolens are pressed with hot iron but a muslin cloth is used to cover the garment to prevent matting of fibers.

IN TEXT QUESTIONS

I. Short answer questions :

1. Why do you need to care and maintain clothing? Write precisely.
2. What are the preliminary actions you need to take before washing clothes?

3. List various steps involved in laundering of clothes.

II. Long answer questions

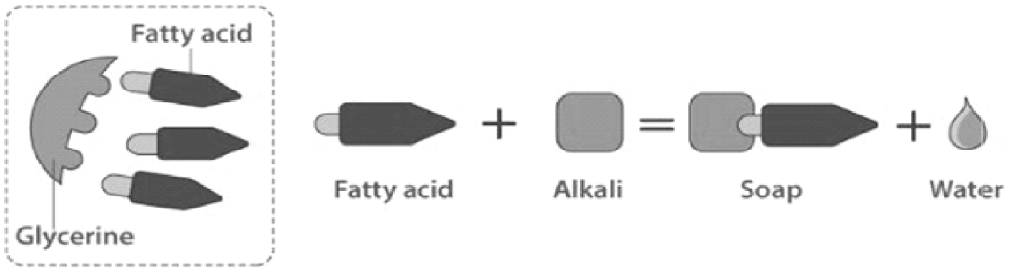
1. Discuss in detail the steps involved in laundering of clothes.

EXPERIMENT

1. Take a piece of polyester / nylon fabric. Press it with hot iron. What changes did you observe?
2. Soak a piece of white fabric and another piece of coloured fabric together in detergent solution for 2 hours. Now take out and rinse in water, dry them. What did you observe?

DETERGENTS AND SOAPS: Any substance, which is capable of removing dirt and grime from the clothes, is called a cleansing agent. There are two types of cleansing agents, soaps and detergents.

Soap: The cleansing agent obtained from mixing of natural oil/ fat and waxes. They are made from both animal and vegetable fats. Animal fats include tallow, grease and olein, vegetable fats include coconut, castor oil, olive oil, soybean oil and mahua oil. These fats are mixed with alkali like caustic soda to make salts. Water is present in varying percentages. Other materials added to soaps are disinfectant, starch, which gives volume to the soap. The process of making soaps in known as saponification.



Detergent (syndet):

The cleansing agent synthesized from chemicals is known as detergent. The detergents are made by treating the long chain hydrocarbons with concentrated sulphuric acid and neutralizing with sodium hydroxide. The various components of a detergent include surfactants, which are responsible for carrying away the dirt, builders, which support the surfactants by improving the cleaning power, foaming agents, which help in foam formation, stabilizers, to hold the soil/ dirt particle in the wash water, optical brighteners for a white effect and small amounts of perfumes and colouring matter.

Table 32 Comparison of Soaps and Detergents

S. No.	Soaps	Detergents/ syndets
1.	Do not dissolve in water readily	Dissolve readily in water
2.	They get wasted by combining with magnesium and magnesium salts of hard water.	They do not get wasted as they don't combine with magnesium and magnesium salts of hard water.
3.	The clothes become dull, grey and stiff after washing, as soaps leave a deposit on the fabric.	The clothes will become soft, fluffy, as there is no deposit on the fabrics.
4.	Can not penetrate in to soiled areas of fabrics.	Can penetrate deep in to soiled parts easily and remove dirt.
5.	Fabric is weakened if not rinsed properly	If water shortage is there, one rinse in clean water is sufficient. Even if some detergent is left over, will not weaken the fabrics.
6.	Soaps don't have perfumes	Detergents contain perfumes, after washing, clothes smell good.

Guidelines for choosing a good soap:

- It should be readily soluble in water.
- Should contain at least 30% water.
- Should be firm and not extremely soft or hard.
- It should be free from resin as it makes clothes yellow and hard.

INTEXT QUESTIONS

I. Short answer questions

1. Write about soaps and detergents.
2. What are the guidelines for choosing a good soap?

II. Long answer questions

1. Distinguish between soaps and detergents.

EXPERIMENT

1. Take an old, soiled garment. Cut two pieces of the same garment. Wash the first sample with a soap and the second piece with detergent solution.

   Which piece of fabric looks better after washing? The one washed with soap or detergent?

AUXILIARIES

What is the last step in cleaning of clothing after washing and rinsing? If they are made of cotton, you may want to apply starch to make them crisp, and apply blue in case of whites. There are many materials used other than soap and detergents in laundering, called as "auxiliaries". These are used to enhance the appearance and functionality of the fabrics.

Auxiliaries:

The cleaning products other than soaps and detergents, used to give a good finish to the fabric during the laundering process. Some of the auxiliaries are

- Blue
- Optical brighteners
- Chemical bleaches
- Stain removing agents
- Stiffening agents

Blue:

Blue is a chemical used as a fabric whitener. It is applied just before the last rinse of fabric. It should be thoroughly mixed for even application. It is available in the form of a powder or liquid.

Optical brighteners:

Optical brightening agents are colorless dyes. They are fluorescent compounds which give very bright colours when applied to the fabric and exposed to sunlight or dried in the sun. they absorb light from the ultraviolet region and reflect back in the visible region. This reflected light has the effect of counteracting the yellowness, thus brightening the whiteness of the fabric. All clothes start looking whiter than white. There is no chemical action so it has no harmful effect on fabrics.

Chemical bleaches:

You have studied about bleaching in the previous lessons. What is the purpose of bleaching? They help to make the fabric bright.

Any bleaching agent is a material or compound that whitens or brightens the fabric through chemical action, which may be oxidizing or reducing. Hence, the bleaches are classified as oxidizing and reducing bleaches.

Oxidizing bleaches:

These bleaches release oxygen and make the stains colorless. These bleaches will have almost permanent effect. Mostly used on fabrics made with natural fibers. Some of the oxidizing bleaches are

Sunlight: In the presence of moisture, sunlight is a natural oxidizing bleach. It is the oldest and simplest method of stain removal.

Javelle water/ sodium hypochlorite: This bleach should always be diluted before use. The fabric should be soaked in bleach till the stain is removed. Once the stain or discoloration is removed, it should be rinsed to remove any remaining bleach in the fabric as it may harm the fabric by weakening it.

Potassium permanganate (KMnO4) and Oxalic acid: These bleaches are used for stains caused by dyes, mildew, perspiration and ink. The brown stains can easily be removed by oxalic acid and by combination of KMnO4 and oxalic acid.

iv) Hydrogen Peroxide ($H_2 O_2$): This is a bleach commonly applied on both vegetable and animal fibers. It is a safe bleach for the silks, woolens and rayons as it has no harmful effect on animal fibers. Always store $H_2 O_2$ in dark bottles, otherwise it does not remain effective.

Reducing bleaches: These bleaches remove oxygen from the stains and make them colorless. They are less strong in action than oxidizing bleaches. They are applied on animal fibers like wool and silk. These bleaches do not have permanent effect on the fabric. Wool and silk sometimes turn yellow when they come in contact with air. This happens because wool and silk are animal fiber. Reducing bleaches are applied to make them pure white and when these fabrics come in contact with air slowly and gradually, they turn yellow and lose their bleaching effect.

Examples of reducing bleaches are

i) Sodium Hydrosulphite

ii) Sodium Bisulphite

Stiffening Agents:

You have studied about stiffening finish in the previous lesson. What is stiffening? What are the materials used to give crispness and volume to the fabric? Starch is generally used to make fabrics such as cotton and linen. Silk is stiffened by application of gum. These materials help in giving crispness and shine to the fabric. starched fabrics do not get soiled easy. This is because a thin coating is formed on the fabric surface, which resists soil from reaching deep in to the interstices of fabric structure.

INTEXT QUESTIONS

I. Short answer questions

1. What is blue? Explain its functionality briefly.
2. What are optical brighteners?
3. Write a short note on stiffening agents.

II. Long answer questions

1. What are auxiliaries? Explain about most commonly used auxiliaries in laundering.

2. What are chemical bleaches? Classify and explain about each category with examples.

STAIN REMOVAL:

Stain : A stain is an unwanted discoloration caused by an accident. Stains on clothes have to be removed before laundering otherwise they become permanent and make the clothes unattractive. Fresh stains are easier to remove than dried ones. Most of the stains should be cleaned with cold water first. Blood for example should never be cleaned with hot water as heat sets in the stain making it more permanent.

Types of stains:

Stains are classified as

i) Vegetable stains

ii) Animal stains

iii) Oil stains

iv) Mineral stains

i) Vegetable stains: These stains are acidic in nature. Hence alkaline medium is most suitable to remove them. Ex: Tea, Coffee, fruits, vegetables, perspiration (fresh stain).

ii) Animal Stains: These are protein in nature. They get fixed onto the fabric if hot water is used for stain removal. Hence, they should always be washed in cold water. Ex: Blood, milk, meat, egg etc.

iii) Oil Stains: These are easily removed by using soap, solvent or absorbent. Ex: Oil, ghee, butter, cream.

iv) Mineral Stains: These stains are better treated first in acidic medium followed by alkaline medium. Ex: ink, rust, medicine etc.

Principles of stain removal:

- Stains should be removed when they are fresh. They should not be allowed to dry.
- Identify the nature of the stain.
- Dilute the stain removing agent in order to avoid damage to the fabric.
- Unknown stain should be first removed with cold water & then with detergent in cold water.
- Acidic stains should be treated with alkaline medium so that a soluble salt is produced which can be leached out easily.
- Stains should be worked out in a circular motion, from outside to inside.
- Work on the wrong side of the stain.
- Stain removing agent should be washed off thoroughly
- Check for color fastness of the fabric before stain removal, by testing at the seam or hem allowance
- Inflammable chemical agents like petrol etc should be used carefully
- While using bleach, bleach the entire garment rather than the stained area to prevent uneven color removal.

Methods of stain removal:

1. **Solvent Action:** The stained area is dipped in an organic solvent which dissolves the stain.

2. **Mechanical and emulsifying action:** Stained area is sponged or rubbed which dislodges the stain without dissolving.

3. **Chemical action:** Insoluble stain is made soluble through oxidation and reduction process. It is later washed out from the fabric.

4. **Digestion:** The stained area is exposed to enzyme which digests it thereby helping in its removal. Residue can then be washed away.

5. **Absorption:** Absorbents like chalk, corn meal, fullers earth are used in stain removal as they will absorb the liquid staining ingredient like grease, oils.

Table. 33 Technic of Stain Removal

S. No.	Name of the stain	White cottons	Coloured cottons	Silks and woolens	Synthetics/ nylon/ polyester, acrylic
1.	**Tea/ coffee**	**Fresh** coffee stain Pour boiling water on the stain. **Old dried stain** Dip the stain in glycerine	Soak in warm water and borax Same as for white cottons	Same as for coloured cottons Pour hydrogen peroxide solution and gently rub the stain	Same as for coloured cottons Dip in warm water with few sodium perborate drops, until stain is removed
2.	**Blood/ egg/ meat**	**Fresh** Wash with cold water and soap **Old stains** Wash with salt water. Add 2 tbsp of salt to ½ bucket of water	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons

3.	**Butter/ ghee/ oil/ curry**	**Fresh** Same as Wash with hot water and soap **Old stains** Make a paste of soap and water and apply on stain, leave under sunlight, until stain is removed	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons
4.	**Grass**	**Fresh** Wash with water and soap **Old stains** Dip the stained portion in methylated spirit	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons
5.	**Beetle leaf**	**Fresh** Apply onion paste and leave in sunlight **Old stains** Repeat the above process two or three times	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons
6.	**Mehandi**	**Fresh** Dip in warm milk for half-an -hour **Old stain** Repeat the above process for three times	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons

7.	**Lipstick**	**Fresh** Pour cold water Old stains Apply glycerin on the stain and leave overnight and then wash	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons	Same as for white cottons Same as for white cottons
8.	**Ballpoint ink**	Dab the mark with methylated spirit, then rub &rinse.	Same as for white cottons	Same as for white cottons	Same as for white cottons
9.	**Jam stains**	Soak in a solution of borax and water; then wash as usual.	Same as for white cottons	Same as for white cottons	Same as for white cottons
10.	**Chewing gum**	Put the garment in a plastic bag in the freezer for a while or put an ice pack on the gum. Crack off the solid pieces. Sponge the remainder with dry cleaning fluid.	Same as for white cottons	Same as for white cottons	Same as for white cottons

INTEXT QUESTIONS

I. Short answer questions

1. What is a stain? Explain about different types of stains.
2. Write a short note on the principles of stain removal.

II. Long answer questions

1. Discuss in detail stain removal techniques for different stains.

UNIT - 38

DIIFERNT METHODS OF LAUNDERING:

What is the next step after mending, sorting and stain removal? It is washing. Some parts of the clothing like collars, cuffs, hems of trousers or skirts will be more dirty. You need to focus specially on such areas by applying friction through rubbing or brushing. the two major factors that affect the method of washing to be used are, the extent of dirt in the fabric, the type of fiber the fabric is made of. You have studied various fiber properties in the previous chapter. You know that cotton becomes stronger when wet, whereas rayon loses strength. Hence, you can apply pressure to clean cottons but the rayons should be handled gently. Likewise, silk and woolens also need careful handling while washing as silk loses strength and woolens go out of shape or get stretched if not handled properly. No single method of washing is suitable for all fibers. The most commonly used methods of washing are discussed below.

Friction washing

This method is most suitable for fabrics which can withstand friction and pressure, like cotton. the friction can be applied by different means.

i) Friction by hand: Hand application of friction is done by rubbing vigorously, suitable for heavily soiled items like small garments etc.

ii) Friction by plastic scrubbing brush: keep the dirty garment on a flat surface, apply detergent and rub with the plastic brush. This is suitable for strong fabrics with heavy dirt.

iii) Beating with a stick: this method is most sutiable for cleaning large items like bedsheets, blankets.

Suction washing

This method is commonly used for cleaning of clothes which have special surfaces like pile weave fabrics, on which brushes can not be used, as it may damage the surface of the fabric. Example is Turkish towels. The item is dipped in soap solution in a tub and a suction washer is pressed down and lifted up repeatedly. The vigorous suction action loosens the dirt particles.

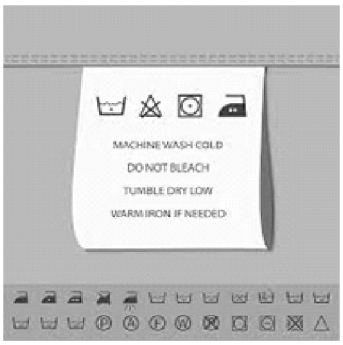
Washing by kneading and squeezing:

This method is most sutiable for delicate fabrics, which require special handling, like silks, rayon, woolens etc. this method involves application of gentle pressure by rubbing with hands, does not damage the fiber or shape of the garment.

Washing by Machine

Washing machine is a labor-saving device especially useful for large institutions and homes. The washing time varies with types of fabrics and amount of soiling. Woolens take less time than cottons to get cleaned. The instructions with the machine should be read carefully before using it. The detailed procedure of laundering specific fabrics will be given on care labels, which includes the type of wash cycle, washing water temperature and drying temperature.

CARE LABELS FOR WASHING:



What is the purpose of care labels? A label is defined as that part of a product, which carries information about the product or the sellers. Labels in the clothing industry provide guidelines to the consumer about the quality and care of the product.

Label, are permanently attached to garments on the inside where they do not show during wear. They are usually made of ribbon or cloth. They may be attached at the back neckline or waistline, on a facing, or at a side seam. It has even become fashionable to put labels on the outside of sportswear garments. Jeans often have leather like printed patch sewn on the outside. They may be any color or style as long as they do not ravel. They must give certain types of information. Sometimes label information is stamped onto shirt tails or collars with indelible ink, or glued or fused on to fabrics.

Uses of Care Labels:

Care labels have many benefits mainly for the consumer:

- Reliable care labels prolong the life of the product.
- Care labels help consumers in making buying decisions that are based on their awareness of the materials (fibers, fabrics).
- Care labels ensure that the appearance and performance of the product are maintained through proper cleaning process.
- Besides this care labels add value to the products.
- Care labels have to be printed at least in three different languages, especially when the products are for overseas markets.

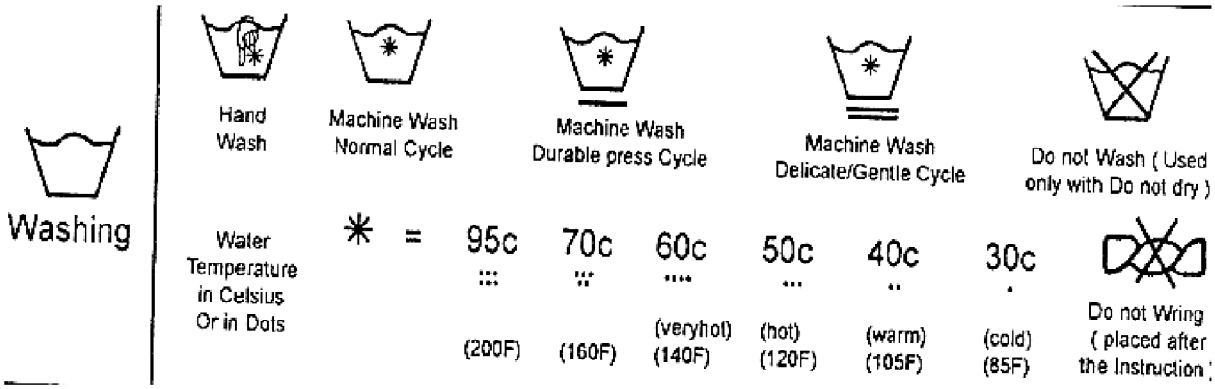
ASTM Care Label System:

The ASTM (American Society for Testing Materials) care labeling committee has developed care symbols in place of words on an apparel care label. The ASTM care symbols are simple, precise and easy to understand. They are used all over the world for care labels. The ASTM care symbol system uses six basic symbols to depict textile care instructions on a label. The five symbols for the basic care processes are:

- The washtub (washing)
- Triangle (bleaching)
- Square (drying)
- Iron (ironing and pressing)
- Circle (dry cleaning)
- The sixth symbol is ‘X’ is placed over the other symbols and indicates ‘Do Not’

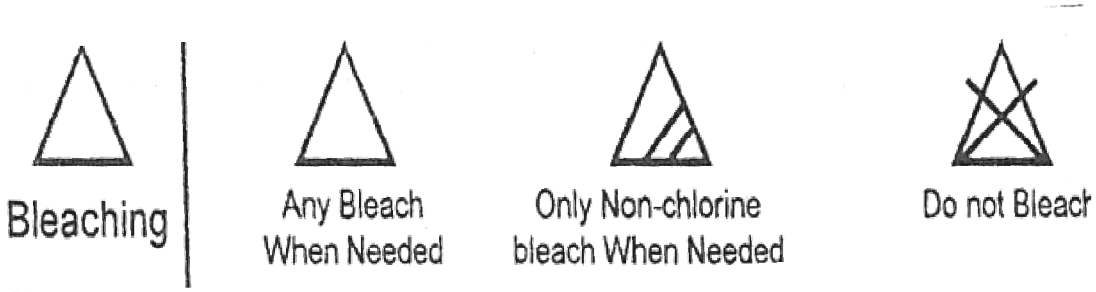
Washing symbols:

- The washtub is used to represent the washing process. The machine cycle placed under the tub and the water temperature is indicated by dots the Celsius symbol inside the tub. Other wash symbols include a hand in the tub to indicate hand washing and a twisted cloth with an "X" on its means do not wring. Dots have been used to indicate the water temperature. 'X' on the washtub indicates do not wash.

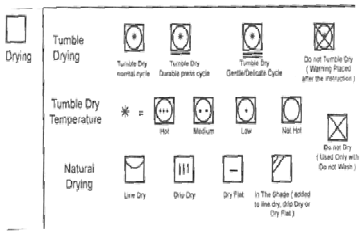


Bleaching symbols:

The triangle represents bleaching. The plain triangle means any bleach can be used, when needed. The shaded triangle means only non-chlorine bleach and the shaded triangle with an "X" through it means do not bleach.



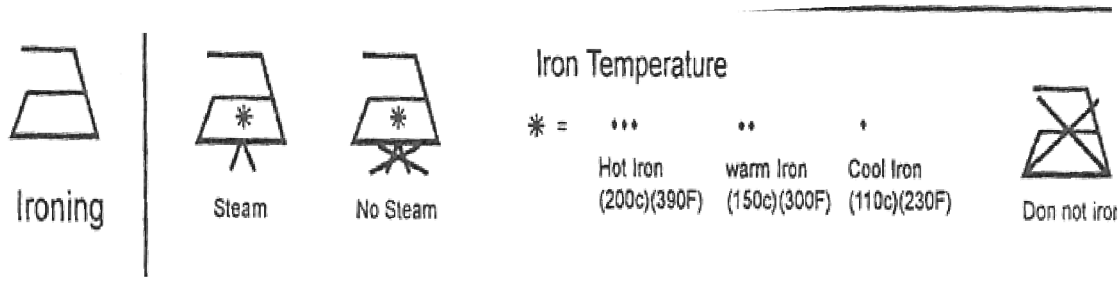
Drying symbols: The square represents tumble-drying and air-drying. The square with a circle inside depicts tumble-drying. Dots and underlines represent the tumble-drying, heat settings and machine cycles. There are also other symbols for tumble dry no heat (a solid circle) in the square and for tumble dry any heat (an empty circle in the square)



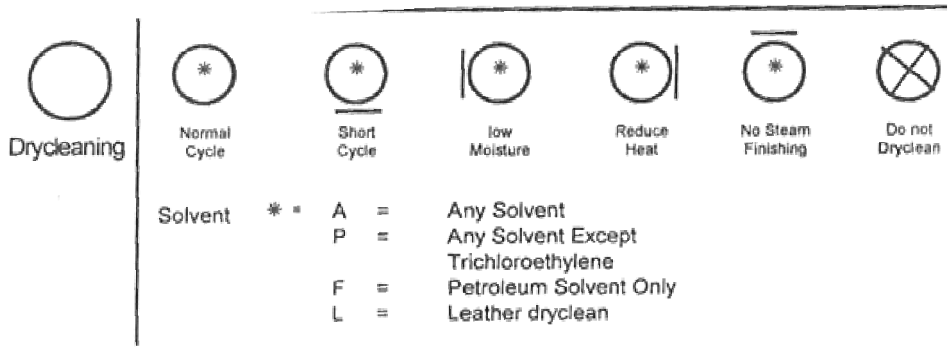
Air-drying is indicated by symbols inside the square. A clothesline in the square means line dry, three vertical lines in the square mean drip dry and a horizontal line in the square means dry flat. If diagonal lines are placed over a symbol, it means dry in the shade.

Ironing symbols: The iron represents iron or press steam may also be used to indicate it.

An "X" on the iron represents no iron, no steam.



Dry clearing symbols: The circle represents the process of dry cleaning. The additional four symbols are short cycle, low moisture, no steam finishing and low heat. One of the issues related to dry cleaning is the accurate reporting of the solvent used in dry cleaning. Any new solvents used in dry cleaning can be reported by these symbols. 'X' symbol on circle indicates do not dry clean the fabric.



DRYCLEANING

Drycleaning is a most important method of caring of non-washable clothes. You must have noticed some tags and care labels indicating dry-clean only instruction. Some of the expensive, delicate silks, woolens, lace and net garments, which require careful handling during cleaning, which are sensitive to detergents and bleaches require drycleaning. Some dyes may runout and stain the light-colored areas of the clothing. For example, an expensive sari with light coloured body and contrast dark borders and pallu may get spoiled if soak in detergent and wash it. In such cases also dry cleaning is instructed. Instead of regular washing, in dry cleaning. The dirt is removed by a solvent action, grease and absorbents. These solvents do not penetrate the fabric as water does in ordinary washing. These have no effect on the colour of the fabric, the material does not shrink, lose shape or finish as is frequently the case in wet cleaning. Woolens, as you remember, do not get dirty quickly hence do not need to be washed as frequently as other fabrics. Hence, what they really require is "spot cleaning". You can do the spot cleaning at home. Dirty spots get fixed to the fabric with grease. If you remove grease the spot is gone. Use grease absorbents or solvents. Some of these are:

Absorbents:

French Chalk, Fuller's earth, moong powder, besan, talcum powder, magnesium carbonate, etc. are used for removing spots from all kind of materials.

Grease solvents:

White petrol, benzene, carbon tetrachloride, methylated spirit etc.

STORAGE OF TEXTILES

You have learnt about how to clean clothes but if you don't store them properly, they may be attacked by insects and moths. Moths and other insects can attack clothes made from animal fibers. Cellulosics like cotton, linen may be damaged by silverfish and mildew. The amount of destruction of these garments by moths is so high that one has to take steps to prevent it.

Considerations for storage of textiles

- Brush garments thoroughly and often keep them free from dust. Empty out pockets. Shake well before brushing. Sun and air kill the grubs and keep the moths away.
- Garments which have been worn should not be put away until they have been thoroughly aired. Cup boards, boxes and clothes-closets should be aired frequently.
- Washable garments should be laundered frequently. Garments which cannot be laundered should be dry cleaned occasionally.
- Suits and overcoats should be hung away on cloth hangers.
- Light often fades the colour of fabrics, hence protect them with cloth covers. Keep such garments in dark closets which can be frequently aired.
- Do not store garments in a damp condition. Moist atmosphere causes mildew, which penetrates into the fiber changes its colour and may even cause it to fall to pieces.

Protective measures against insects:
Wool fabrics are more prone to damage by insects. The following measures can prevent insects attack on textiles.

Spraying : Wool and its storage place may be sprayed with a fluid or dust insecticide in which D.D.T is incorporated to give it a measure of permanent protection.

Repellent : Repellents such as tobacco, dried neem leaves, cedar chips, camphor, and moth balls are used. Naphthalene flakes are more efficient than the traditional moth balls. Para dichlorobenzene is the best repellent.

Packing : Pack away all woolens and furs wrapped in newspapers as the moth dislikes printer's ink. The box may be lined and covered with tarred paper.

Fumigation: It is a poisonous gas example is hydrocyanic acid. It destroys grubs and moths.

Addition of an insecticide to the wool

It involves adding substances to the wool which either poisons the larvae or renders the wool indigestible.

INTEXT QUESTIONS

I. Short answer questions

1. What is a label? Explain the purpose of care labels.
2. List the uses of care labels.
3. Write a short note on ASTM care label system.
4. What protective measures can be taken to prevent damage of textiles by insects? Discuss briefly.

II. Long answer questions

1. Discuss in detail about care labels for laundering and finishing of clothing.
2. Why proper storage of textiles is essential? Write about the important points to be considered and preventive measures.

EXPERIMENT

1. Collect five different clothing items like, t-shirts, ready-made Kurtis, shirts, trousers and undergarments. Observe the care labels closely, write down the instructions given. Analyze the instructions and note down the reasons for the given care instructions.
2. Take out your stored woolen sweater. Smell the odour of the garment. Observe the surface of the sweater with a magnifying glass. What did you observe? Are there any minute grubs attached to the surface? Does the sweater smell badly? Is there any discolouration? Note down your observations and conclusion.

UNIT - 39

INDENTIFICATION OF APAPREL AND FABRICS:

CARE LABELS AND MARKINGS There has been a huge growth in development of textile fibers.

Hence a huge number of fibers and their blends are available in the market, which has created need for care labels. Certain delicate fabrics like expensive silks, lace, nets require special care while handling, require instructions on how to wash, detergents to be used and avoided, ironing temperatures etc. Hence, to help consumers in getting information world wide regulations have been issued and implemented to attach care instructions to the garments.

When you buy garments, hand tags labels and tags are attached to them, which give information about products. The price, brand name, special features, fiber content, finishes, manufacturers, country of origin and care instructions are given. . Hangtags and labels exist to identify products, to help sell them, to help consumers make decisions about them and explain proper care. Labels are made with many types of materials such as paper, cardboard, fabric, plastic etc.

Sometimes eye catchy hang tags are made with pleasing colour combinations, with fashion illustrations explaining the construction details, or emphasizing the quality of fabric, trims etc. sometimes the information may be exaggerated and faulty, misleading the consumers. Packaging, price tags, hangtags are all used to intelligently market the readymade garments.

What about fabric information? If you watch carefully, at the beginning of the fabric on "than", a marking will be there. Markings printed in different shapes, on the fabric gives brief information about the fabric for identification of fiber content, brand name and finishes given. Examples are Bombay Dyeing, DCM etc. some names printed on fabrics like poplin and Lizzy bizzy may not mean anything to consumers but to remember the fabric name as such. Sometimes the certification labels may be found which show the approval of certain quality control agencies, stating the product meets certain standards. Examples are "Wool mark" for woolen products, "Silk mark" for pure silk saris etc.

MALPRACTICES: Do you know about food adulteration? Selling of adultered milk, food grains, flours, spices and condiments? Selling of faulty products with substandard quality is known as malpractice. Do you know how malpractices are carried out in selling of textile materials? Can you give some examples? Yes. Next to food items, malpractices are very common in selling of textiles.

You may buy a dress when attracted by its dark colour and snug fit. But when you wash it, colour may run in the wash water, staining other while clothes and the brand-new dress may look dull and faded. When you wear the dress, it may be too tight or there is a marked reduction in the length of the dress. This is due to shrinkage after washing. The temporary finish given for stiffening may be lost in first wash and the garment may appear limp and shapeless. Some of the trimmings attached in ready made garments

like, lace borders, decorative buttons, attractive prints might be lost after few washes. The components of embroidery such as beads, Zari threads, sequins may come loose after wearing only for few times. These all are the results of buying inferior quality materials.

You can identify some of these faulty goods by observing closely. But certain fiber-based malpractices are difficult to identify unless you have an in-depth knowledge of fiber properties. For example, the expensive silk sari your mother bought may not be a pure silk, may be a blend of silk and polyester or may be made of viscose rayon, which is a cheaper substitute for pure silk. Likewise, the woolen shawl or sweater may not be made of wool, instead made with acrylic, which has similar properties as wool and less expensive. When you buy a fabric also, you might suffer the malpractice of the seller. The various types of commonly found malpractices in textiles are discussed below.

Malpractices in fabric sector – selling less quantity or inferior quality fabric If you purchase a salwar suit set, it consists of top fabric, salwar fabric and dupatta. They might not be according to the quantity mentioned on the label or as advertised by the seller. The top fabric should be 2.5 meters, and salwar material, 2 meters and dupatta material from 2.25-2.50 meters. But, most of the sets may not meet these standards, selling less quantity of fabric, particularly top fabrics and dupattas. Even when you try to purchase a 2 meters fabric, the shopkeeper may sell at 10-15cms less quantity of fabric.

Cheating on price – charging more price than displayed price : Some of the retailers will increase the price of the textile items, particularly ready-made garments, quoting extra cost, or by displaying faulty discount and increasing the price while paying the bill. This is very common practice followed in many reputed chain of cloth stores in malls. They advertise the sale of items to mislead the consumers. Example sale up to 50% on selected items. This statemt misleads consumers, a generic marketing technique followed by many expensive retail stores.

Selling faulty or defective goods : Many sellers of ready-made garments and home textiles, sell export rejects, known as “seconds” which are either damaged, or of inferior quality for a lesser price. Did you see the news paper advertisements about selling expensive clothing having minute defects, at throw away prices? This is a common cheating practice.

Providing false, wrong, incomplete, misleading information through labels or markings: You have learnt about labels and markings in the previous chapter. You know what kind of information is given to consumers through these items. The labels on your t-shirts or Kurtis should provide correct information on fiber content, care to be taken while washing, ironing, colour fastness of the dye and finishes given if any, and correct size of the garment. If you are buying a curtain, the important properties such as light fastness, durability of the fabric must be printed on the package, otherwise, it is considered as incomplete information. The dimensions of home textiles like bed sheets or comforters should be accurate, otherwise the consumer will be at loss.

Hence, as a consumer, you should be alert, vigilant and be aware of these common malpractices and should not become a victim to the cheating practices. The Consumer Protection Regulation Act (1988) protects the consumers against the above discussed malpractices.

INTEXT QUESTIONS

I. Short answer questions

1. Write a short note on hang tags.
2. Explain the purpose of hang tags and care labels.
3. What is the importance of fabric markings?

II. Long answer questions

1. Discuss in detail about malpractices in textile and ready-made garment industries.

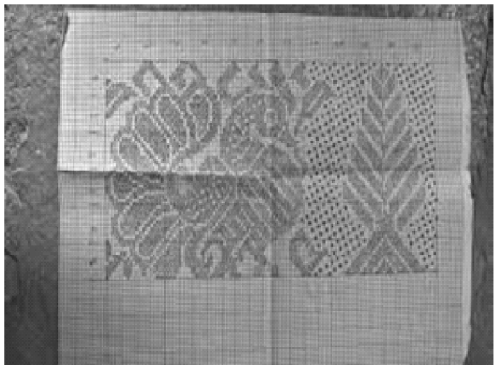
EXPERIMENT

1. Visit few fabric retail shops. Observe the fabric markings on “thans”. Note down the printed information. What did you understand about the fabrics?
2. Visit few ready-made garment shops and observe the hang tags and care labels. “. Note down the printed information. What did you understand about the garments?

UNIT - 40

TRADITIONAL TEXTILES AND CRAFTS OF TELANGANA

The Telangana region is a mixture of customs introduced during Mughal reign of Nizams and south Indian traditions and culture. Many beautiful handloom weaving traditions, exquisite hand crafts lineage are the heritage of Telangana. Some of the handloom materials and crafts of Telangana are explained below.



1. Pochampally Ikkats: Pochampally is a village in Telangana state, famous for resist tie dyed, woven textiles. The specialty of Pochampally is its silk sarees made by ikat technique. There are number of villages around Pochampallyall involved in creating this craft. Mercerized and unmercerized cotton yarn, degummed silk yarn is used in making Pochampally textiles. The warp is spread longitudinally in a sheet form and the design is marked on it. The portion to remain white is tied with cotton thread, or rubber strips, while the portion to be dyed is left exposed. The work of tying proceeds until the whole design is completed. The tied warp is then immersed in the dye bath and dyed. After the dyeing is completed, the warp is washed well in cold water and dried. The tying work and dyeing are further repeated to produce as many colours as desired. After the final dyeing, the ties on the yarns are removed. After dyeing of warp and weft separately, the weaving is done. Products made at Pochampally include silk and cotton sarees, dress materials, mercerized and unmercerized bedsheets, curtains, diwan sets, table linen etc.

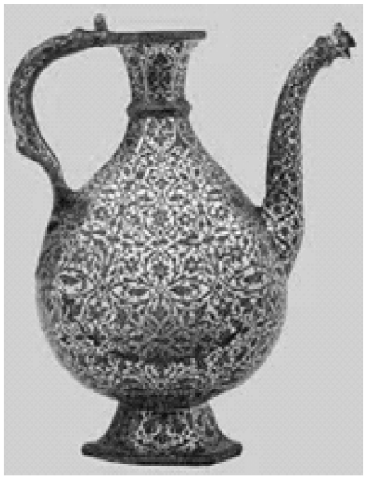
2. Gollabhama saris: Gollabhama saris are famous for their simplicity, intricate motifs of "Gollabhama" or milk maids, spread all over the sari. The sari was traditionally made in white colours, the current weavers are exploring beautiful colour combinations. Siddhipet of Telangana is the place famous for weaving of these saris.

3. Narayanpet saris: Narayanpet waver's cluster is located in Telangana, famous in south India, for cotton, polycot and silk saris. A unique process is employed for the manufacture, where eight sarees are made at one go on a loom. Hence, instead of seven yards of fabric being mounted on the loom, 56 yards of silk are mounted on the loom at a single time. Cotton Narayanpet sari takes a day or two to be made, while silk Narayanpet sari takes longer depending upon the complexity of the design. The Narayanpet silk saris have a distinctive style of their own, influenced by the styles evolved in the Maharashtra region with the patti border and a broad pallu. They are made in contrast colours.

4. Gadwal Saris: Gadwal saris of Telangana are world famous for their sheer beauty and elegance. The sari consists of cotton body and silk borders and pallu. If mercerized cotton yarns are used, then they are called "sico Gadwal" saris. The zari border and pallu are woven separately and attached to the body of the sari. The weave is so light that, the sari can be packed in to a match box.

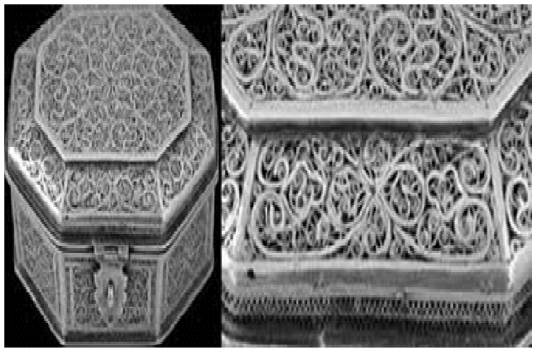
5. Durries: Warangal district is famous for the durries (rug) making industry, which is gaining popularity in recent years. The weavers are understanding the need for replacing the old dull colours and designs with more attractive designs and bright colours, to suit to modern aesthetics. Floral designs, tie & dye designs are usually used to make decorative durries, which are in high demand. Other types of durries made include, kalamkari block printed, durries and plain durries.

6. Metal handicrafts of pembarti: Pembarti of Warangal district is famous for the metal sheet crafts, which date back to Kakatiya dynasty, where the art was used to decorate temples Known as brass art tradition. The Nizams have patronized the art and brought it back to fame. Most popular products made include big vessels called gangalam, "Kakatiya kirti thoranam", an archway of victory of Kakatiya dynasty and Ramappa temple's exquisitely decorated Nandi.



7. Bidri crafts: The craft is name after Bidar, Karnataka, which was once a part of the princely state of Hyderabad. This metal craft involves engraving silver on gun metal, which is an alloy of Copper and Zinc. The Bidri crafts have black surfaces with silver silver inlay standing out. Most popular products made include jewelry boxes, flower vases, hookah pots etc.

8. Silver filigree handicrafts: Delicate, exquisite silver filigree was created by the artisans of Karimnagar. The crafts are made by twisting the silver wires, to create net like structure. These superior quality silver crafts are totally handmade, with motifs like birds, flowers, leaves and other natural motifs. Usually, silver filigree is used to make silver jewellery, jewellery boxes etc.



9. Cheriyal paintings: This traditional fabric painting technique is originated in Cheriyal, Warangal district. Canvas made from khadi was used to depict stories from Indian mythology and folklore. Natural colours were used by artisans to paint directly on canvas. Red is the most commonly used background colour; daily life activities of rural areas were also painted on to the scrolls. The scrolls were used to narrate stories in temples and village gatherings.

Nirmal paintings: Nirmal town in Adilabad district is famous for the handicrafts and paintings. The artists are called as "Naqash" and they use natural paints obtained from minerals, gums and herbs.

Other than paitnings, crafts, they make bowls, boxes, trays and lacquered furniture.

INTEXT QUESTIONS

I. Short answer questions

1. Write a short note on Gadwal saris and Gollabhama saris.
2. Write briefly about Narayanpet saris.

II. Long answer questions

1. Explain in detail about traditional woven saris of Telangana state.
2. Explain in detail about traditional handicrafts of Telangana state.

EXPERIMENT

1. Collect pictures of traditional woven saris and traditional handicrafts and paste them in a small note book to prepare a scrap book. Write the names of the things.

PRACTICAL – 1
Categorization of Different Food Items

Categorization of different food items available at home into various food groups

AIM: To collect different food items which are available at home and categorize them under various food groups.

INTRODUCTION: The diet we eat should contain different types of foods in such quantities and proportion that the meet for all the macro and micro nutrients is adequately met;thereby it becomes a balanced diet. These foods are categorized in to five food groups based on their nutritional composition. While making a meal plan it is necessary to include food items from each of the five food groups to make it healthy and balanced

The five food groups include

Group 1- Cereals, Grains and products
Group 2: - Pulses and legumes
Group 3- Milk and Meat products
Group 4: Fruits and vegetables
Group 5: Fats and sugars

Materials required:

Pen, paper and 20-30 food items

Procedure: Collect 20 -30 food items whichare available at home.

Make sure that collect all food items which are used in small quantities

Identify the characteristics of the different food items and categorize and list them into the food groups mentioned above

OBSERVATION:

S.No	Food item	Major nutrient	Food group

CONCLUSION: Based on your's observation, state which of the food group consumption is the largest and which of the food group consumption is smallest

PRACTICAL -2

Preparation of Grilled and Steamed Product

Write the method of preparation of recipe using dry heat cooking method and moist heat cooking method

Aim: To prepare grilled tofu and steamed tofu.

Introduction: Cooking with 'dry heat' is a process where food is exposed to a source of high heat either from below or above (and usually in an oven). This form of heat brings foods to a much higher temperature than cooking with 'wet heat'. It also gives foods a brown crust or surface, which adds flavour.

There are many ways to cook with dry heat

Grilling, broiling, baking, roasting, sautéing or stir-frying, and searing are the different ways to cook using dry heat:

Let us prepare tofu using grilling method.

Grilling uses heat from underneath to cook the food. Barbequing is a common grilling technique. Use a hot grill to make sure that food doesn't stick and use a lid to cook foods quickly. Kebobs with vegetables and meat or vegetables and tofu are also prepared well using the grill.

Materials required
Tofu cubes
Electric Grill plate

Food is cooked on metal grates that are placed over a heat source in order to produce a smoky, charred flavor. Grills can use gas, electricity, charcoal or wood. Meats, poultry, fish and vegetables can all be grilled.

Procedure:

1. Heat the grill plate
   A very common cause for food sticking to a grill is the heat is too low when the food is added...
2. Clean the Grill. ...
3. Oil the Grill. ...
4. Place the tofu cubes on the grill plate.
5. Grill It, Don't Set it on fire!

Moist Heat Method

Moist cooking methods are those methods that use a hot liquid to cook food. That liquid can be water, broth, wine or juice. Unlike dry cooking methods like roasting or baking, which use hot air to cook food, moist cooking methods preserve and even add moisture to the food as it is cooking. This property makes these cooking methods especially appropriate for food that needs softening, for example, hard vegetables, tough meat or dry grains and beans.

Boiling, steaming, poaching and simmering are the moist heat methods of cooking the food.

Materials Required:

Tofu cubes
Large Pot

Procedure:

1. Bring a small amount of water to a boil.
2. Fill a large wok or pot with 1.5-inches water and bring to a rolling boil.
3. Place your vegetables in the steamer. ...
4. Lower your steamer into the wok or pot. ...
5. Cover and steam tofu.

   Steaming involves cooking food over a liquid that is heated to a temperature high enough to generate steam.

   Specially made steamers have holes in the bottom and sides that enable the cook to lift the food out of the water in the bottom of the pan.

   The lid of the pan traps the steam, creating a hot, moist environment, which cooks the food. Steaming is ideal not only for delicate foods like steamed breads, it also maintains the nutrition of vegetables, which can lose vitamins to the water in which they are cooked.

Conclusion:

After processing Tofu using dry heat and moist heat methods check the texture of it please rate the physical appearance of it using both the methods.

Fluffy / slippery/ wrinkly/rough

TABLE FOR OBSERVATION:

Food : TOFU

Method	Colour Before / After	Texture Before / After	Flavour Before / After	
Grilling				
Steaming				

CONCLUSION: _____Cooking improves the look, flavour and eating quality of food and makes it palatable

PRACTICAL -3
Survey of Food Habbits of Adolesent

Survey of the food habits of adolescents using food frequency questionnaire method.

Aim: To elicit the food habits of an adolescent using food frequency questionnaire method.

Introduction:

- The frequency of food consumption is assessed by a multiple response grid in which respondents are asked to estimate how often a particular food or beverage is consumed.
- Categories ranging from 'never' or 'less than once a month' to '6+ per day' are used and participants have to choose one of these options.

Materials required

Food frequency questionnaire

PART I

Date

Time

Place

Part I: General Information

a) Name of the interviewee

b) Age

c) Sex

d) Educational qualification

A) If studying name of the school

B) If working occupation

e) Education of mother

i) Mother

ii) Father

f) Occupation

1) Mother

2) Father

g) Family income (Approximately)

h) Type of family Nuclear/ Joint

i) No of a) brothers

b) Sisters

j) Birth of the interviewee

k) Eldest/Youngest/second/Third

PART- B

Food Items	Alternate day (6)	Daily Once (7)	Daily Twice (8)	Twice a Week	Once a week	Fortnightly
Cereals						
Rice						
Wheat						
Riceflakes						
Ricepuffed						
Wheatgerm						
Semolina						
Vermicelli						
Millets						
Jowar						
Bajra						
Ragi						
Barley						
Maize						
Pulsesandlegumes						
Redgramdhal						
Red gramwhole						
Greengramdhal						
Greengramwhole						
Blackgramdhal						
Blackgramwhole						
Horsegramwhole						
Cowpea						
Greenpeas						
Rajmah						
Soyabean						
Leafy vegetables						
Amaranth						
Ambatchuka						
Cabbage						
Coriander						

Curryleaves						
Fenugreek						
Lettuce						
Ponnagani						
Gogu						
Spinach						
Roots and Tubers						
Potato						
Carrot						
Beetroot						
Onion						
Radish						
Sweetpotato						
Yam						
Other vegetables						
Beans						
Bittergourd						
Bottle gourd						
Brinjal						
Broadbeans						
Cauliflower						
Clusterbeans						
Colocasia						
Cucumber						
Doublebeans						
Drumstick						
Kovai						
Ladiesfinger						
Mango,green, raw						
Onionstalks						
Plantation						
Ridgegourd						
Snake gourd						
Nuts and Oil seeds						

Almonds						
Cashewnut						
Coconut						
Groundnut						
Ginger						
Pistachionut						
Walnut						
Flaxseeds						
Spices and						
condiments						
Asafoetida						
Cardamom						
Chillies,dry						
Chillies, green						
Cloves						
Coriander						
Cuminseeds						
Fenugreekseeds						
Garlic						
Ginger						
Limepeel						
Mangopowder						
Nutmeg						
Blackpepper						
Poppyseeds						
Tamarind						
Turmeric						
Fruits						
Apple						
Apricot						
Amla						
Banana						
Cherries						
Dates						

Grapes						
Grapes(Black)						
Guava						
figs						
Jackfruit						
kiwi						
Sweetlemon/ lime						
Mango,ripe						
Muskmelon						
Orange						
Papaya						
Pomegranate						
Pineapple						
RaisinsdriedGolden						
Raisinsdried black						
Seethaphal						
Sapota						
Strawberry						
Watermelon						
Milk and its						
products						
Milk						
Buttermilk						
Curd						
Skimmedmilk						
Paneer						
Cheese						
Khoa						
Meat, Poultry and Fish						
Egg						
Chicken						
Mutton						
Liver						
Pork						

Beef						
Fish						
Fats and oils						
Butter						
Ghee						
Hydrogenatedoil						
Cooking oil						
Sugars						
Sugarcane						
Honey						
Jaggery						
Sago						
Miscellaneous foods						
Coconutwater						
Soups						
Salads						
Sauces						
Desserts						
Cakes						
Pastries						
Icecreams						
Soft drinks						
Bakeryfoods						
Tea						
Coffee						

Conclusion:

1. Do you find the adolescents consuming all the food groups on daily basis (atleast one item from each food group).

   If not specify the food groups which are not consumed regularly.

PRACTICAL - 4
Language Development in Children

Observation of language development in children aged between 1 ½ to 3years old.

Aim: to observe children in the age group of 1 ½ – 3 years for their language achievement

Introduction: Language development among children gets influenced by genetics as well as the environment.

The first stage of language development often occurs between zero and six months. Children in this phase don't have developed language skills, so they communicate with sounds. Change in the tone and slowly picks up single word and then two syllable words.

PROCEDURE:

1. Identify from your neighborhood/ family/any other place. Two children one about 1 ½ year and the other about 3 years of age.
2. Visit \both the children once or twice before doing the actual formal observations. So that they become familiar with you and learn to accept you.
3. Observe one child at a time, for about 20 minutes and record your observation in tables 4.1 and 4.2. Repeat the process on two other days.
4. Use separate tables for each child. Record the date and timing in the first column of the tables. Note down each word/sentence spoken by the children in the second column for all three days.
5. Fill up the other columns after the period of observation is over. Two examples of words/ sentences have been worked out in the table.

Name _____ **years-**_____ **Months**_____ **Address** _____

Date and Time	Record of Words / Sentences	Language analysis			
		No of words	Simple Sentence	Complex Sentence	Incomplete Sentence
Total					

Observation of child

Date and Time	Record of Words / Sentences	Language analysis			
		No of words	Simple Sentence	Complex Sentence	Incomplete Sentence
Total					

Calculate the following in order to analyze the language spoke by the two children.

S.No.	Formula	Calculation	
		Child I	Child II
1.	Percentage of simple sentences= No of simple sentences / Total no of sentences x100		
2.	Percentage of complex sentences= No of complex sentences / Total no of sentences x100		
3.	Percentage of incomplete sentences= No of incomplete sentences / Total no of sentences x100		

Conclusion: On the basis of calculations state if there is a difference in the vocabulary of one year old and three year old child? if Yes what is the difference

What is the nature of sentences generally used by the two?

PRACTICAL - 5
Observation of Child 1-2 years

Aim: Observation of a child in the age group of 1-2 years and record how he/she expresses anger fear

Introduction:

Emotional development is a complex task that begins in infancy and continues into adulthood. The ?rst emotions that can be recognized in babies include joy, anger, sadness and fear.

The child expresses the emotions through different behaviours which makes it possible to determine the emotion

Anger is generally expressed by

a) Hitting

b) Pushing

c) kicking

d) holding another against his will

e) taking another child's toy

f) crying

g) shouting

h) using bad language

i) raising bad language

j) biting

Fear is usually expressed by

k) crying

l) physical contact with another person/object or by clinging to some person/object.

m) Getting started

n) Running away

o) Hiding

p) Putting the head in one's own lap

q) Closing the ears with the fingers

r) Besides the behavior's mentioned above, each child may use some other waysof expressing anger and fear.

Procedure:

1. Identify a child in the 1- 2 years age group.
2. Talk to the child's guardian/ parents explain to them your reasons for observations their child for one hour.
3. Record the following information.

Name of the child:

Age:
Sex: Male / Female
Place of observation
Time period:

Given below are two tables. Record angry behavior in table 5.1 and record the expression of fear in table 5.2

As and when the child shows either of the emotions, record the event or situation leading upto it and the child's way of expressing it.

Table 5.1: Record of Anger

S.No	Events	Cause of anger	Type of behavior	Intensity		
				Mild	Moderate	High

Table 5.2: Record of Fear

S.No	Events	Cause of anger	Type of behavior	Intensity	
				Mild	Moderate

In both the tables analyze each of the events and the type of behavior exhibited in each situation and classify the intensity of the emotion. Anger can be classified as either mild, moderate or high based on the following.

1) Mild form of anger is when the child raises the voice or makes an angry face.

2) Moderate form of anger is when the child uses bad language or shouts.

3) High form of anger is when he kicks, bites, hits etc.

Classify fear as mild or severe based on the following.

a) In mild form of fear the child stops the activity or hugs known adult with a feeling of fear

b) In severe form of fear the child starts screaming or howling after facing a fear situation.

Conclusion: From the above result please answer if the fear and anger in the situation justified? Comment if could these be avoided, if yes? How would you classify the child on that particular day Happy/ Irritable/ Aggressive/ Withdrawn?

PRACTICAL - 6
Physical, Social and Emotional Changes in Adolscent

Aim: ToInterview a teenager about the physical changes and the social and emotional problems faced during adolescence

Introduction: Various changes take place during adolescence. Prominent among these are physical changes, including puberty, and social and psychological changes, with development of reasoning skills, rational thought, and moral judgment.

Using the questionnaire given below interview the teenager to record out the changes she/ he is undergoing.

Procedure: Identify a teenager (13-19 years of age) for interviewing.

Introduce yourself and chat with the teenager informally once or twice. Make the environment comfortable. This process is called building rapport

Inform the teenager about the interview and fixa time to the male interviewer isdifferent;

Make sure you familiarize with the questions of the interview and during the interview make sure all the questions are asked

Questions to be interviewed by girl to the female interviewer and by a boy . Note down the answers and keep them confidential. Donot talk and interrupt excessively.

Interview Schedule

Date

Time

Place

Part I: General Information

e) Name of the interviewee
f) Age
g) Sex
h) Educational qualification

A) If studying name of the school

B) If working occupation

e) Education of mother

iii) Mother

iv) Father

l) Occupation

2) Mother

3) Father

m) Family income (Approximately)

n) Type of family Nuclear / Joint

o) No of a) brothers

c) Sisters

p) Birth of the interviewee

q) Eldest/Youngest/second/Third

Part II

1) As you entered in to your teens do you think are you different from what you were before?

2) How much height you have gained

3) Have your body proportion changed

4) Have a lot of friends / relatives started commenting about your physical appearance? If so what are the comments

5) Have you observed any changes in the way you are treated by

   Your family yes/No
   Other adults yes/No
   Your friends Yes/No
   Your siblings EYs /No

6) Can you describe the changes

7) Do you like these changes

8) Do you find any change in your attitude towards the opposite sex? If Yes can you describe the change

PART III-A TO BE USED BY FEMALES TO INTERVIEW A GIRL

1) Has your menstruation cycle started? If yes, at what age did it start?

2) Were you aware of the menstruation cycle before it started? If yes, since which age have you known about it?

3) How did you learn about it for the first time?

4) What were your reactions when the first menstruation occurred?

   (i) Were any restrictions imposed on you since the onset of menstruation?

   Yes/No

(ii) If yes, describe the restrictions in terms of:

a) type of clothes worn:

b) going out:

c) interacting with members of opposite sex:

d) any other

PART III - B TO BE USED BY MALES TO INTERVIEW A BOY

1. At what age did you first notice the occurrence of facial hair and thicker body hair

2. What was your reaction

3. What was the reaction of your a) friends b) parents: c) siblings

4. Did you like their reaction

(i) When did your voice begin to change

(ii) What was other people's reaction to it

(iii) How did you feel about the change and the people's reaction?

5. (i) At what age did you have the first nocturnal emission?

(ii) Did you know about it before? If yes, then since when?

(iii) How did you learn about it for the first time?

(iv) What were your reactions when it occurred for the first time

6. Do you think there is a difference in the amount of freedom you enjoy and theamount you had before teenage? If yes describe how.

PART IV

I) If you face any emotional problem, who do you turn to tor help?

2) What change do you feel in your role as you are growing up?

3) Do you think you are ready to take up all the responsibilities of an adult?

CONCLUSION

1) Was the interviewee an early/ late / normal mature?

2) What physical changes had the interviewee undergone since entering teenage?

3) What emotional problems, if any, was the interviewee facing?

PRACTICAL 7
ADULTRATION OF FOOD

AIM : To detect addition of water in milk

INTRODUCTION: Food adulteration is the practice of adding food or material to lower quality of the food. The foods can be adulterated intentionally to lower the quality of food, or maybe due to negligence while handling, or due metallic adulterants through packing material. Details ofadulteration are explained in the Module IV (Unit 15) of Food adulteration.

EQUIPMENT AND MATERIAL REQUIRED.

Lactometer (range 0-40)

1. Test Tube , Iodine solution/ Tincture of Iodine 10ml
2. Sample : Milk 5 ml
3. Measuring Cylinder
4. Test tube
5. Test tube holder

PROCEDURE: Add 5 ml sample milk in the lactometer and record the reading

Observation: if the milk is adulterated with water ,the lacto-meter reading shall be more than 26 .

PRACTICAL 8
FOOD LABELLING

AIM: To study the food labels in the market.

INTRODUCTION : Labelling is essential as it helps the producer to attract the consumer and a direct means of communicating information to the consumer. For the consumer labels help to decide on the purchase of the product as per the requirement. There are different types of labels , they are brand labels, informative labels , descriptive labels, grade labels, allergen labelling and nutrition labels.

EQUIPMENT REQUIRED :

Paper and pen.

Food Labels 10

PROCEDURE: Collect 10 food labels. Examine each of the label and mark on the sheet provided .

Give the names of the Product.

S. No.	Name of food Product	Manufacturer Name
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

S.No.	Norms	Label Numbers										Total	
	Item No	1	2	3	4	5	6	7	8	9	10	Yes	No
1	Name of Product												
2	Nutrition facts												
3	Manufacture Date												
4	Expiry date												
5	Food Type label, green/red												
6	Food Color's used												
7	Added salt												
8	Added Sugar												

PRACTICAL 9
FOOD PRESERVATION

AIM : To Preserve seasonal foods

INTRODUCTION: Food Preservation is a method to protect food from spoilage due to microbiological growth, and to preserve food for alonger time and during off season times. .To prevent microbiological contamination, to kill pathogens, tominimize food spoilage, food poisoning, to prevent wastage and to use during off season ,food preservation methods are used.

EQUIPMENT AND MATERIALS REQUIRED

1. Stainless steel utensils likepots,pans with lids etc. and a rust free knife
2. Sterilized bottles to store jam.
3. Cooking Stove
4. Clean aprons
5. Muslin cloth for straining and covering
6. A pair of tongs
7. Ingredients for Apple Jam: (method is given below)

APPLE JAM

Ingredients:

Apples	200 gms
Sugar	200gms
Water	3 Tsps (15 ml)
Citric acid	½ tsp
Colour	a few drops (Optional)

Note: Jams can be made from pineapple, peaches, plums,grapes, pears, papaya, mango and as a mixed fruit jam .

Procedure:

1. Select just ripe apples, wash and cut them into pieces, without coring or peeling.
2. Place in a pressure cooker with water and acid/ lemons
3. Cook for 5 minutes, and rub through a sieve
4. Add sugar, stir until dissolved , bring to boil with constant stirring in a deep pan
5. Test for a good gel using the sheet test (take jam in a spoon, pour it down, if done the jam sticks to the spoon like a sheet).
6. Remove.
   Add colour (if desired) and put in a sterilized bottle.
7. Seal the jar with molten wax paraffinwax and screw the top Label it.

PRACTICAL 10
FOOD SAFETY

AIM: To study food safety methods adopted in a house.

Introduction: Food safety means that food is safe and acceptable to human consumption, knowing how to buy ,prepare and store food to prevent spread of harmful bacteria that cause food borne illnesses. Access to sufficient amount of safe and nutritious foodis key to sustaining life andpromoting goodhealth.Unsafe food containing harmful bacteria, viruses, parasites or chemical substances cause severaldiseases ranging from diarrhea to cancers. Cook thoroughly, keep food at safetemperatures and use safewater andrawmaterial.

MATERIAL AND METHODS

Paper and Pen

METHOD : Observe Two street venders selling cooked food and record your observations. Give your observation report .

Street vendor

Place

Cooked Food Sold :

Record your observations for the following :

1.	Water used for cooking	1 from bucket	2. From Tap	3.from a Bore
2.	Cooking vessels	1. Aluminum	2. Stainless	3. Iron
3.	Eating plates	1. Disposal	2. Aluminum	3. Stain steel
4.	Serving food	1. Spoon	2. Mug	3. Hand
5.	Food Server uses	1. Gloves	2. Hand	3. Spoon
6.	Display of cooked food	1. Open	2. Closed enclosure	3. Covered
7.	Is the shop	1. Enclosed	2. Open cart	3. kitchen
8.	Use of oil	1. Fresh oil	2. Used oil	3. Reheated
9.	Is the food cooked	1. at home	2. On the spot	3.Packed food
10.	Disposal of waste	1. Thrown on roadside	2. near foot path	
	2. collected in a bag.			

Write a report on your observations.

PRACTICAL 11
PACKING MATERIAL

AIM: To identify different types of packing material used different products .

INTRODUCTION: Packaging protects and contains food to minimize environmental influence on food. Packaging is the enclosure of products in wrapped pouch, bag, box, tray , bottle or other container. Packaging is essential to protect food from shock, compression, temperatures, to protect from oxygen, water vapour and dust, to group small items in one packaging, to transmit information regarding how to use, and transport. Packaging can encourage buyers to purchase the product, it protects food from environmental hazards and adulteration. Packaging has several layers -1. Primary packaging comes in direct contact with material, 2. Secondary Packaging protects material against water vapour, light, heat, impact, and 3. Tertiary packing (External packaging) is the outer packaging of packed goods.

MATERIAL AND EQUIPMENT REQUIRED :

Paper, Pen, Pencil and erasers

Method : Collect one packing material used from the following categories:

Solid food - raw cereals, pulses.

Liquid food – milk, juices, oil, squashes.

Cooked food /processed food- Jam, curries.

Ready to eat food –one vegetarian and one non -vegetarian item

Observe the packing material and note following..

1. Name of the product
2. Weight of the product
3. Is food Packed food Raw / cooked
4. Material used for primary packaging-plastic /aluminum foil/tin /any other
5. Does it have secondary packing yes/no
6. If yes - Material used for Secondary Packing
7. Does the food have a third level packing Yes /No
8. If yes what material used
9. Does the packing material has a label
10. What type label and instructions given

Observations : Write report on your observations.

PRACTICAL 12
METHODS OF SANITATION

AIM : to assess the level of sanitation.

Introduction: Basic sanitation is defined as having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage collection, industrial/hazardous waste management, and waste water treatment and disposal, keeping places free from dirt, infection, disease, etc., by removing waste, trash and garbage, by cleaning streets.

METHOD: Collect information on the following aspects of sanitation and give your suggestions for improvement .

Assess thesanitation inyour area

1. Garbage Disposal : by MCH lorry/ scavengers /owners dispose
2. Frequency of clearing garbage/ daily/twice a week/ alternate day
3. Time of water: same timings/ timings irregular / only morning
4. Drinking Water supply: municipal water/ borewell/well water
5. Frequency ofWater Supply:Daily/twice weekly /weekly/ alternate day
6. Water charges: free water /partial payment /full payment
7. Sanitation:Roads cement road/ tar(damber) road / mud road
8. Cleaned daily/ alternate day/ rarely
9. Health promotion programs: polio program/dengue awareness/Malaria
10. Fumigation done: monthly/when needed/occasionally
11. Drainage system good/ needs correction/ corrected when needed

Fill the questionnaire and Identify the sanitation conditions and suggest improvements needed

PRACTICAL –13

List down any five long term and short-term goals that you have set for yourself. Mention the resources required to achieve those goals.

<table>
<tr><td>Aim:</td><td colspan="3">To study the types of goals and also to identify the resources required to achieve the goals.</td></tr>
<tr><td>Introduction:</td><td colspan="3">Goals are the end towards which families work. Goals emerge directly from the values and they are achieved through the process of management. Goals should be carefully analysed in the relation to the resources each person has. Goals must be selected based on desirability, acceptability, attainability and felt most important by the family, which takes time and may require discussions.

Resources can be defined as the means which are available and recognized for their potential in meeting demands. Resources are used to make decision for achieving goals of the family.

Goals are classified into 3 types

i. Short term goal which represents an objective, condition or something you intend to achieve in the immediate future. Usually these involve a time period of six months or even less. They tend to be more clearly identified. Achievement of short term goals may lead to initiation of long term goals. Eg. Finding ingredients while cooking.

ii. Intermediate or medium term goals are a link to connecting between short term and long term goals. The time period for these goals is several months or year. These goals assist in attaining the long term goals. Eg. Reach college on time.

iii. Long term goals are considered fairly permanent. They are sought or achieved over a long period of time. These goals are the first goals a family formulates and the last that are achieved. Eg. Be punctual, study well and complete inter with good grades.</td></tr>
<tr><td></td><td>Type of goals</td><td>Goal</td><td>Resource required</td></tr>
<tr><td></td><td>Short term goal</td><td>Attending classes regularly</td><td>Note book, pen, uniform, etc.</td></tr>
<tr><td></td><td>Long term goals</td><td>Finish intermediate with good grades</td><td>Daily attendance in the college, stationery items, interest, etc.</td></tr>
<tr><td>Exercise :</td><td colspan="3">List down the short term and long term goal and then list down the resources required to attain each goal in the following table.</td></tr>
</table>

Short term goal	Resources required
1. 2. 3. 4. 5.	
Long term goal	**Resources required**
1. 2. 3. 4. 5.	
Conclusion :	

PRACTICAL – 14

Mention various non-electric and electric gadgets used in kitchen

Aim :	To create awareness on the different electrical and non- electric gadgets used in kitchen.
Introduction:	There are various activities performed in a home. Most of the activities are performed either by hand or by different gadgets. The gadgets are again divided into two- based on the energy consumption i.e., electrical and non- electrical. These gadgets are used to simplify the work at home or to do the work in less time or to reduce the manual load of work. 

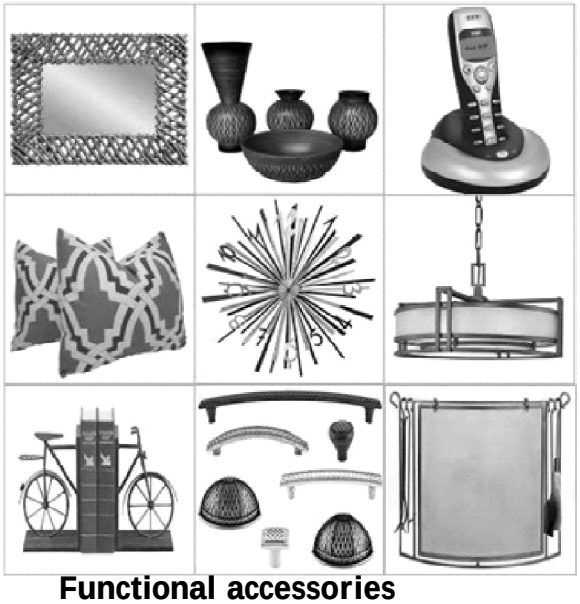
	Examples of electric gadgets: Phone, Tele vision, Washing machine, Refrigerator, Mixer, Grinder, Electric Cooker, etc. Examples of Non- electric gadgets: Choppers, Cutting boards, Roti presser, Pressure cooker, Slicer, Toaster, etc.
Exercise:	Find out and list down different electric and non- electric gadgets used in your kitchen along with pictures.

	Electric gadgets	**Non- electric gadgets**
1.		
2.		
3.		
4.		
5.		

Conclusion :	

PRACTICAL – 15

Prepare any functional or decorative accessory for your living room.

Aim :	To prepare any functional or decorative accessory for a living room
Introduction:	Accessory is a thing which can be added to something else in order to make it more useful, versatile, or attractive. Accessories are two types i.e., functional and decorative. A functional accessory has a purpose, and created to fulfil any function while the decorative accessories adore the interiors and add on the aesthetics of a room.  **Functional accessories**  **Decorative accessories**
Exercise :	Prepare a functional or decorative accessory for a living room
Raw material required.	

Preparation process :	
Picture of the accessory:	
Conclusion:	

PRACTICAL – 16

Identify and list down the consumer commodities available in the market with FPO and AGMARK

Aim: To learn about the standard marks and know different items that has FPO and AGMARK symbols on their labels.

Introduction: Consumer commodity means any food, drug, device, cosmetic, or other article, product, or commodity.

These are used by individuals for purposes of personal care or in the performance of services ordinarily rendered in or around the household, and which usually is consumed or expended in the course of such consumption or use.

These consumer commodities are available in market with different standardization symbols on them, which gives information to the consumers. Some of the standardization marks are ISO, AGMARK, FPO, Hologram, Silk mark, etc.

- FPO stands for Farmers Producers Organisation. It is an organisation of farmer-producers that provide support to small farmers with end-to-end services covering almost all aspects of cultivation from inputs, technical services to processing and marketing.

- AGMARK is a certification mark employed on agricultural products in India, assuring that they conform to a set of standards approved by the Directorate of Marketing and Inspection an attached Office of the Department of Agriculture, Cooperation and Farmers Welfare under Ministry of Agricultural & Farmers Welfare an agency of the Government of India.

AGMARK symbol

Exercise:	Identify and list down the consumer commodities available in the market with FPO and AGMARK

S. No:	Consumercommodities with FPO symbol	Consumer commodities with AGMARK symbol
1.		
2.		
3.		
4.		
5.		

Conclusion:	

PRACTICAL – 17

Interview five families who faced malpractices of the sellers and give suggestions to Inovercome those problems

Aim:	To learn how the sellers' malpractice to sell of their goods and create awareness among the consumers to overcome problems with malpractice.
Introduction:	Malpractice is said to be "failure to act correctly or legally when doing any work, often causing injury or loss." There are various types of malpractices that can be done by a seller, and these are as follows: • Selling an adulterated product which means adding some bad materials to the product being sold. • Selling fake goods, which means selling something with less value as an alternative to the real product. • Selling substandard goods, which means sale of commodities that do not conform to the given standards of quality. • Selling duplicate or copy goods. • Using false weights and measures that lead to making the product underweight. • Doing black-marketing that leads to shortage of goods as well as hike in prices. • Charging over the MRP, i.e. maximum retail price of a product. • Supplying defective or damaged goods. • Showing false or misleading advertisements, which means the advertisements are falsely claiming that a product or service is good or of a great standard. • Supplying poor services, which means the quality of services is worse than the expected or standard quality. **Suggestions to overcome problems due to malpractices of the sellers:** i. Be aware about various goods and services available in the market so that an intelligent and wise choice can be made. ii. Buy only standardised goods as they provide quality assurance. Thus, look for ISI mark on electrical goods, FPO mark on food products, Hallmark on jewelry, etc.

	iii. Learn about the risks associated with products and services, follow manufacturer's instructions and use the products safely. iv. Read labels carefully so as to have information about prices, net weight, manufacturing and expiry dates, etc. v. Assert yourself to ensure that you get a fair deal. vi. Be honest in your dealings. Choose only from legal goods and services and discourage unscrupulous practices like black-marketing, hoarding, etc. vii. Ask for a cash memo on purchase of goods or services. This would serve as a proof of the purchase made. viii. File a complaint in an appropriate consumer forum in case of a shortcoming in the quality of goods purchased or services availed. Do not fail to take an action even when the amount involved is small. ix. Form consumer societies which would play an active part in educating consumers and safeguarding their interests. x. Respect the environment. Avoid waste, littering and contributing to pollution.
Exercise:	Interview families who faced malpractices of the sellers and give suggestions to overcome those problems.

Answer the following question with Yes or No. If yes, use a Tick (v) mark in the columns and No with a (X) mark	F1	F2	F3	F4	F5
1. Sold an adulterated product					
2. Sold fake goods					
3. Sold substandard goods					
4. Sold duplicate or copy goods					
5. Used false weights and measures					
6. Black-marketing					
7. Charged over the MRP					
8. Supplied defective or damaged goods.					

9.	Shown false or misleading advertisements	
10.	Supplied poor services	
	Suggestions given to overcome the problems due to malpractices of the sellers:	1. 2. 3. 4. 5. 6. 7. 8.
Conclusion:		

PRACTICAL – 18

Identify activities carried out in public, private and social spaces in residential buildings and list down the suitable accessories for these spaces

Aim: To learn about different spaces and activities performed in each space in residential buildings and also to know the suitable accessories for those spaces.

Introduction: In residential buildings, spaces are divided into three: i. e., (i) Public space, (ii) Private space and (iii) Social space. Each space has different functions and different activities are performed which requires suitable accessories.

i. Public space is a place that is open and accessible to all the family members. Eg. Dining room and Living room. Activities carried out here are having meals, sitting, communicating, etc. accessories required in public spaces are crockery, mirror, table mats, table cloth, coasters, etc.

Accessories required in a dining room

i. Private Space means the volume of space around a person defined by the extent of reach in all directions; kinesphere. Eg. Bed room and Bath room. Activities carried out here are grooming, sleeping, etc. accessories required in a private space are bed linen, mirror for grooming, vanity box, soap stand, etc.

Accessories required in a bed room and bath room

iii. Social space is the area that have been designed to optimize and promote family and social interaction (other than family). Eg. Living room and lobby. Activities carried out here are meeting, gatherings, etc.

Exercise:	Identify activities carried out in public, private and social spaces in residential buildings and list down the suitable accessories for these spaces		
Spaces	Name of the room	Activities carried out	Picture of the accessories required
Private space			
Public space			
Social space			
Conclusion:			

PRACTICAL 19

IDENTIFICATION OF TEXTILE FIBERS

Aim: To identify the common textile fibers in use.

Introduction: Fibers are the fundamental units of fabrics. Because of the wide variety of textile fibers available, consumers easily get cheated due to the malpractices prevalent in the market. To prevent being cheated and to choose the desirable type of fabric for a specific purpose, knowledge of fiber identification is very useful. Most commonly used tests for fiber identification are visual test, burning test and microscopic test.

I. Visual test:

Aim: To conduct visual test to identify the fiber.

Introduction:

This is the first step in fiber identification. Experience in handling and feeling fabrics develops the expertise to identify the fiber.

Materials required:

Fabric samples -5 No.

Procedure:

Ravel the warp and weft fibers from the fabric, keep them separately, observe the following characteristics and record them in the table given.

Exercise:

Collect five different fabric samples.

Make the following observations and record them.

a. Length of the fiber: To observe the length of the fiber, hold the yarn against the light and observe its surface. If the yarn has rough surface, it means it is made of staple fibers, which are short. If the yarn has smooth surface, the yarn is made with filament fibers, which are long.

b. Luster: Ravel fibers from the yarn and observe whether they have high, medium or low luster.

c. Texture: Observe the texture of yarns and fibers, how they felt between two fingers, soft to hard or rough to smooth.

Paste the fabric sample in the table under “sample” column.

Table.1. Identification of Textile Fibers - Visual Test

S. No.	Fiber	Sample	Length	Luster	Texture
1.					
2.					
3.					
4.					
5.					

II. Burning Test:

Aim: To conduct burning test to identify the fiber.

Introduction:

Burning test is used to identify the chemical composition of the fiber like cellulose, (cotton, linen) protein (wool, silk) synthetic (polyester, nylon, acrylic), manmade (rayon) and identify, to which group the fiber belongs.

Materials required:

1. fabric samples -5 No.

2. candle -1

3. lighter / match box

4. forceps

Procedure:

Ravel warp and weft yarns separately, untwist them into fibers. Now hold them with forceps and introduce slowly to the edge of the flame of a candle light. Observe the reaction of the fibers as they approach the flame. Hold the fiber in flame for 1-2- seconds and remove quickly. Observe the behavior of fiber, when in flame. Notice if any smell is given by the fiberduring burning or charring. Observe if any residue is formed or ash is left. Repeat the same for the weft yarn. Record your observations in the Table.

Exercise:

Make the following observations and record them in the table.

a. Nature of ignition: See whether the fibers ignite readily, slowly or melt.

b. Rate of burning: Observe whether the fibers burn slowly or with great difficulty or fast when they are in flame.

c. Flammability after removing from the flame: See whether the fibers burn evenly after removing from flame or whether they are self-extinguishing. You should also observe, if there is any after glow after removing from the flame.

d. Nature of smell (odour): Observe whether the fibers give any smell of burnt paper or burnt hair, chemical or sweet (aromatic) smell after burning.

e. Nature of residue: Feel the residue between fingers to observe whether it is soft, crisp or hard.

Table.2. Identification of Textile Fibers - Burning Test

S. No.	Fiber	Nature of ignition	Rate of burning	Flammability – away from flame	Nature of smell or odour	Residue or ash

III. Microscopic test:

Aim: to identify the given textile fiber by observing under microscope.

Introduction:

By observing the fiber under microscope, you can gain knowledge of fiberstructures, differences between fibers belonging to different groups and you can understand why certain fibers have particular properties. For example, wool has scaly structure, hence provides warmth. Silk has smooth surface, gives it high lustrous and smooth surface.

Materials required:

1. Student Microscope -1
2. Tweezers
3. Glass slide
4. Cover slip

Procedure:

Clean the glass slide and place a fiber from the untwisted warp yarn and weft yarns at a time. Place a drop of clean water over the fibers, separate few fibers apart from the yarn with help of tweezers. Place one more drop of water over this and cover it with cover slip. Remove excess water, if present. Focus the eye piece and observe the longitudinal structure of the fiber.

Exercise:

Record the following observations.

Table.3. Microscopic Structures of Textile Fibers

Name of the fiber	View under microscope
Cotton	Flat, twisted ribbon like structure
wool	Scaly structure
Silk	Fine, irregular in diameter and may sometimes show small, shaded patches
Viscose rayon	Rod like with a number of light short/ long striations and is not speckled
polyester	Transparent rod like
Acrylic	Rod like with speckles

Table.4. Identification of Textile Fibers - Microscopic Test

S. No.	Fiber	Longitudinal appearance	Microscopy
1			
2			
3			
4			
5			
6			

IV. Identification of unknown fiber

Aim: to identify the unknown fiber present in the given sample.

Introduction:

The purpose of this exercise is to recognize the unknown fibers. The given sample should be studied in the same way described above in first experiment.

Materials required:

1. fabric samples (the samples should be provided by the teacher).
2. forceps
3. candle, match box
4. student microscope
5. glass slides
6. cover slips

Procedure:

The unknown fibers must be subjected to the following tests and observations should be recorded as done earlier Tables 1-4.

1. Visual test
2. Burning test
3. Microscopic test

Table.5. Identification of Unknown Textitile Fibres

Name of the test	**Observation**
Visual test	
Burning test	
Microscopic test	
Inference	Paste the fiber

PRACTICAL 20

Identification of Basic and Novelty Yarns

I. Basic yarns

Aim: To study and identify the basic yarns used in the construction of various types of fabrics.

Introduction:

Different types of yarns are used for making different types of fabrics. Each type of yarn has its own characteristics, which vary according to the making of the yarn and treatment given to it. Yarns influence texture and performance properties of the fabric. yarn is the term that indicates the structure formed by assembling of several fibers which are laid down or twisted together.

Materials required:

The student should collect fabric samples of different textures, thickness and structures.

Procedure:

Ravel warp yarns separately from the collected fabric. hold the yarn against the light source, untwist slowly and record the following observations.

1.Staple yarn or spun yarn

2. Filament yarn

3. Simple yarn – single yarn, ply yarn or cord yarn

Table 1 : Identification of Yarns - Basic Yarns

S. No.	Name of the yarns/ observation	Sample
1.	Staple/ spun yarn	
2.	Filament yarn	
3.	Single yarn	
4.	2 ply yarn	
5.	3 ply yarn	
6.	Cord yarn / cable yarn	

II. Novelty yarns:

Aim: To study and identify the novelty yarns used in making of various fabrics.

Introduction:

Novelty yarns are yarns which are irregular at regular intervals. They may be single, plied or cord, may be filament or spun or textured or combinations of all these. These yarns are called as novelty yarns, because of their appearance. They provide interesting novel appearance to the fabrics. They are also called as “fancy yarns”, mostly used in drapery and upholstery fabrics, used for home textiles than for clothing.

Materials required:

The student should collect different types of novelty yarns.

Procedure:

Ravel both warp and weft yarns separately, hold against light, slowly untwist, observe and record the following

1. Single yarn or ply yarn?

2. Is it a corded yarn?

Identification of Yarns - Novelty / Fancy Yarns

S. No.	Name of the novelty yarns/ observation	Sample
1.	Slub yarn	
2.	Chenille yarn	
3.	Thick & thin yarn	
4.	Flock yarn	
5.	Ratine yarn	
6.	Boucle yarn	
7.	Seed yarn	
8.	Knot yarn	
9.	Snarl yarn	
10.	Spiral yarn	
11.	Core spun yarn	
12.	Metallic yarn	

PRACTICLE 21

Dyeing with Tie & Dye Techniques

Aim: To make different types of designs on cloth by tie & dye method.

Introduction: Tie & dye is an ancient method of decorating fabric by resist dyeing technique and the resist material used is a thread. In this method, the fabric is tied tightly with strong thread and is put in the dye bath. The colour is resisted from penetrating in to tied area. When opened, it leaves a pattern on a colored background. You can use both new and old fabrics. You can give a new look to old fabrics by tie & dye.

Materials required:

1. De-sized white fabric

2. Twine thread for tying the fabric

3. Tub for soaking the fabric

4. Other resist materials required such as beads, pebbles, thread and needle .

Suitable fabrics for tie & dye: georgette, lawn, cambric, poplin, silk, mulmul, voile. Light weight fabrics are easier to tie and also to dye as they take up the dye easily.

Procedure:

Soak the fabric in water for 6-8 hours remove the starch or sizing present in it, then rinse in fresh water several times, dry the fabric and press it flat. You can tie the fabric in multiple layers but should not exceed 4 layers. All the four layers must be timed at a time.

Techniques of tie and dye:

1. Tritic: For any design, draw design on fabric and make tiny running stitches along the traced out-line. Then pull the thread tightly and fasten it.

2.Marbling: crumble the fabric with hand in to a ball. Tie the fabric ball with a yarn or thread randomly and secure the ends. Then dye the fabric. When the dyed fabric is opened by removing the thread, marble effect can be noticed in certain areas.

3. Knotting: Knotting the corners, centre and any desired area of the fabric before dyeing creates interesting circular designs.

4. Bundling: The fabric is pleated horizontally and vertically and then tied with a thread at regular intervals, and then dyed.

5. Spiderweb: The centre of the fabric is picked, to form a cone shape, then the fabric is tied at regular intervals to create beautiful circular webs.

6. Bandhani: To obtain a mango design, draw a dotted mango design. The distance between the dots may be as desired but should not exceed ¾ inch. The lesser the distance between the dots the better the effect. Pick each dot with the help of your fingers or finger nail and knot the area with the thread. Tying is done either with a continuous thread or thread is cut after each spot is tied. The threads to tie dots should always be white.

7. Pleating: Pleating and tying the fabric gives stripe design. Fold the fabric in to tiny pleats either horizontally or vertically as per the direction of stripes. Tie at regular intervals. Tying and dyeing in different colours produce multi colour stripes.

Exercise:

Take five white desized fabric samples of size 15cmsx15cms and prepare the tie and dye samples using above techniques.

PRACTICAL 22

Preparation of Weave Samples

Aim: To acquire the skill of interlacement of yarns for fabric construction.

Introduction:

Woven fabric is formed by the interlacement of 2 set of threads, namely warp and weft threads. These threads are interlaced with one another according to the type of weave or design. Varying the type of interlacements will produce different types of weaves.

Materials required:

1. Different types of colour papers (textured or plain)
2. Paper cutting blade
3. Ceramic tiles or glass sheet as base to cut the paper

Procedure:

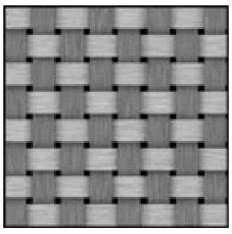
Cut a 12cmx12cm square on a paper of one colour. Leave a border of 1 cm across all the four sides of the square. Mark points 0.5 cm apart on any two sides of the paper, leaving the border. A total of 20 points should be marked. Connect 20 points with a straight line and slit along these lines by using paper cutting blade on a smooth surface like ceramic tile or glass. This will form warp. For weft, cut 0.5.cm strips of 14 cm length on plain or textured paper of another contrast colour. Interlacement can be done as 1x1,2x1 etc. for various weaves.

Exercise:

Prepare the weave samples with contrast-coloured papers for the following weaves.

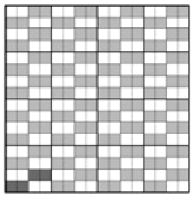
1. Plain weave
2. Rib weave
3. Basket weave
4. Twill weave
5. Satin weave

1. Plain weave: it is the simplest form of weaving. It is reversible with alternate interlacement of warp and weft yarns. It is inexpensive and durable weave. Stripes, checks and plaids are frequently woven in the plain weave. Strong and durable fabrics can be made if the thread count is high. Examples: Muslin, cheese cloth, gingham, lawn, organdie, chiffon, China silk etc. variations created in plain weave are basket weave and rib weave.

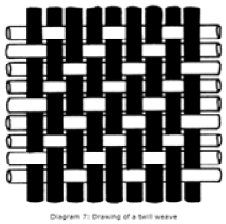


2. Basket weave: it has 2 or more warp threads interlaced as a unit with corresponding weft yarns. This weave gives basket like effect, hence also called as “matt weave”. The matt fabric is used for cross stitch embroidery. Other basket weave fabrics available in the market are oxford cloth, monk’s cloth, coat and suit fabrics.

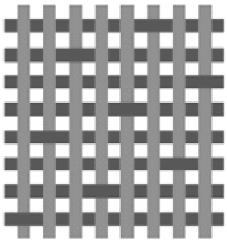
3. Rib weave: Rib or line effect can be created by using heavy yarns in the warp or weft direction. The rib effect can also be obtained by grouping of yarns in specific areas of the warp or weft, or by having more warp yarns than weft yarns. Examples: poplin, ottoman, broad cloth etc.



4. Twill weave : It has diagonal lines on the face or back of the fabric. The denim fabric of jeans is made with this weave. They are strong and durable. Warp yarn goes over two filling yarns and under. Twill weave is classified based on direction of the diagonal line as right-handed twill weave and left-handed twill weave. This weave is more expensive and soils less. This weave can be found in men's suits and coat fabrics. Examples: denim, drill, gabardine, tweeds etc.



5. Satin weave: this weave will give a shiny, smooth surface as it is woven with long floats. warp yarns float over several weft yarns before interlacing with the weft. Hence, more warp yarns appear on the face of the fabric . If weft floats appear on the face, then it is called sateen. The long floats create shiny surface and reflect light but they tend to snag easily. The satin weave is not as strong as plain or twill weave.



PLAIN WEAVE- WEAVE SAMPLE

BASKET WEAVE —WEAVE SAMPLE

TWILL WEAVE -WEAVE SAMPLE

SATIN WEAVE -WEAVE SAMPLE

PRACTICAL 23

Fabric Care Labels and Tags

Aim: To collect fabric labels and tags and to interpret the information given on them.

Introduction:

There are a huge variety of textiles available in the market. You know that each type of fibre requires different type of care and laundering. There may be a single garment made from different types of fibres. Such garments require special care in buying and laundering. Hence, it is necessary that you should have a clear understanding of care labels and tags.

Materials required:

The student should collect three care labels and three hangtags.

Procedure:

Collect labels, tags and interpret the information given below.

Observe the following:

1. Observe whether it is a care label or a hang tag
2. Whether information is printed or stitched
3. How it is fixed to the garment
4. Interpret the given information regarding size of the garment, price, brand name, fibre content, finishes given (if any), manufacturer, country of origin, care instructions and other special instructions.

ASTM Care label System:

The ASTM (American Society for Testing Materials) – is a care labeling committee which has developed the care symbols to be provided on garments. The system uses basic 6 symbols to indicate the textile care instructions on a label. The basic care symbolsare

1. Wash tub – washing
2. Triangle – bleaching
3. Square – drying
4. Iron box – ironing
5. Circle – drycleaning
6. X placed over other symbols indicates “do not”

Two simple patterns, underlines and dots tell the consumer how to set the exact washing machine cycle and heat setting on washer, dryers and irons. Underline signs reduce the action of the machine cycle. Plain symbol indicates normal cycle, one underline means, permanent press cycle and two lines indicate gentle/ delicate cycle.

Dots indicate heat setting or water temperature. One dot indicates cool water or low setting, two dots mean warm water, three dots mean hot water, four dots mean very hot water.

Exercise:

Draw the care labels under the suitable heading, explain what the symbols indicates

Table : Care Labels - Symbols

Washing Symbols
Bleaching symbols
Drying symbols

Ironing symbols

Collect three care labels, paste them in the table given below and write their description.

Table. 2 : Care Labels

Label	Description

PRACTICAL 24

Stain Removal

Aim: To learn the techniques to remove common stains on fabrics.

Introduction:

A stain is an unwanted discoloration caused by accident. Stains on clothes have to be removed before laundering otherwise they become permanent and make the clothes unattractive. Fresh stains are easier to remove than dried ones. Most of the stains should be cleaned with cold water first.

Types of stains:

Stains are classified as

i) Vegetable stains

ii) Animal stains

iii) Oil stains

iv) Mineral stains

i) **Vegetable stains:** These stains are acidic in nature. Hence alkaline medium is most suitable to remove them. Ex: Tea, Coffee, fruits, vegetables, perspiration (fresh stain).

ii) Animal Stains: These are protein in nature. They get fixed onto the fabric if hot water is used for stain removal. Hence, they should always be washed in cold water. Ex: Blood, milk, meat, egg .

iii) Oil Stains: These are easily removed by using soap, solvent or absorbent. Ex: Oil, ghee, butter, cream.

iv) Mineral Stains: These stains are better treated first in acidic medium followed by alkaline medium. Ex: ink, rust, medicine .

Procedure:

The materials required for stain removal and stain removal techniques are discussed below.

Table 1. Stain Removal Techniques for Different Stains

S. No.	Name of the stain	White cottons	Coloured cottons	Silks and woolens	Synthetics/ nylon/ polyester, acrylic