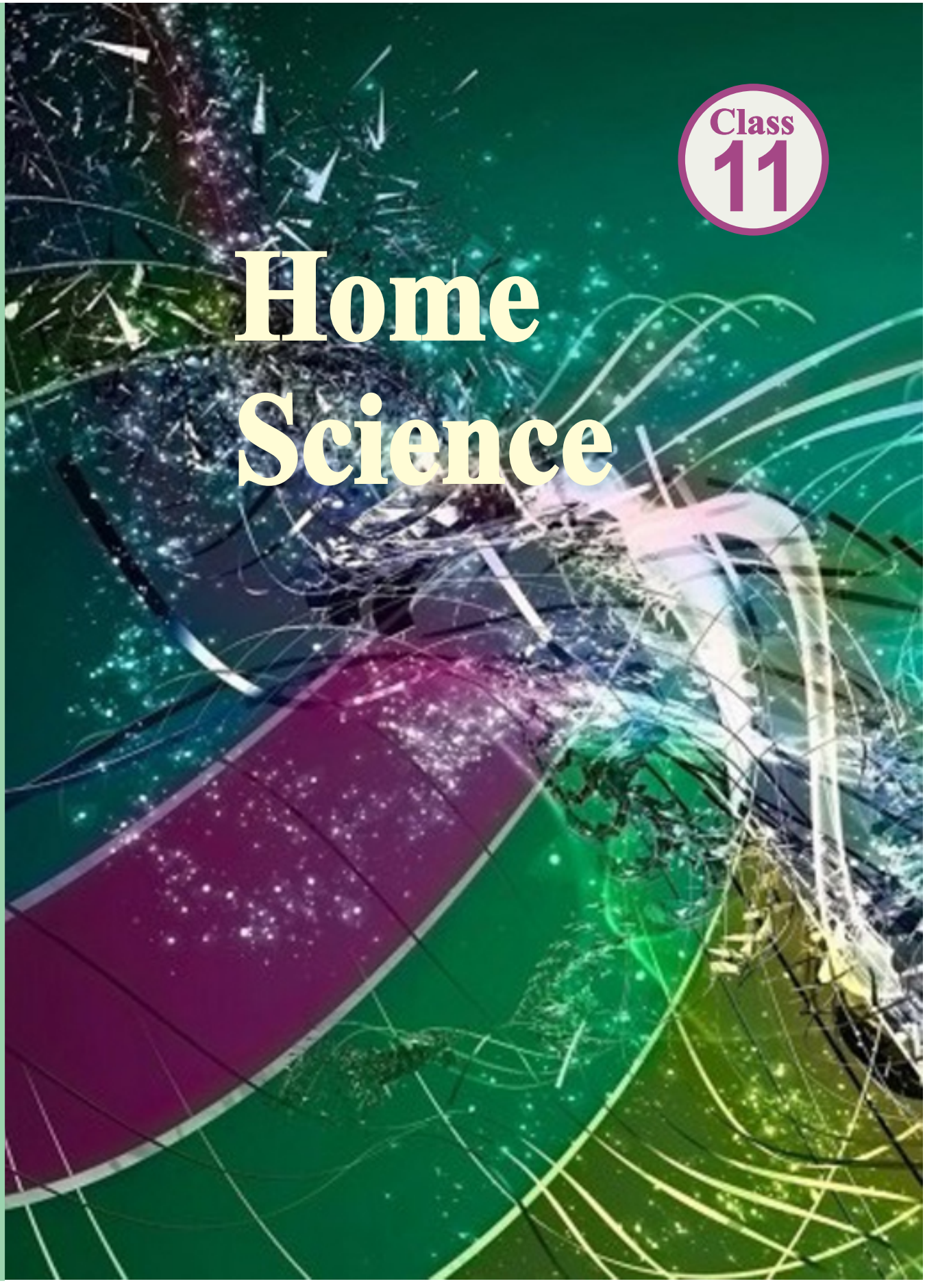

Class 11

Home Science

HOME SCIENCE

CLASS - XI

BOARD OF SECONDARY EDUCATION , RAJASTHAN, AJMER

Text book Writing Commitee

Home Science Class XI

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Foreword

For students, textbook is the basis of sequential studies, confirmation, review and future studies. The level of school text book becomes very important from the content and teaching - method's perspective. Text-books should not be made insentient or to glorify things. Even today text-books are an important instrument of teaching-learning process, which cannot be ignored.

For the last few years the syllabus of Board of Secondary Education, Rajasthan was felt to be lacking in representation of linguistic and cultural events of Rajasthan. Keeping this in view the state government decided to implement its syllabus through Board of Secondary Education, Rajasthan, for the students of class 9-12. In accordance to this, Board, has got assembled the text-books for classes 9 to 11 from the session 2016-17 based on the set syllabus. Hope these text books will be instrumental in providing the students with originality of thought process, contemplation and expression.

Prof. B.L. Choudhary
Chairman
Board of Secondary Education Rajasthan
Ajmer

PREFACE

Home Science is an extremely useful and important subject. It is practical education which is being studied and taught in various schools of India. This subject includes understanding the activities of daily life, their usefulness and scientific solutions to the problems related to these activities. In this field students also learn the skill to display their artistic expression. This book is an effort to conjoin the theoretical as well as the practical subject-matter in the Indian perspective.

The book consists of six units. The first unit includes the idea and scope of Home Science, the second unit deals with human development and family studies, the third unit includes subject matter on family nutrition, the fourth unit includes textile and garment, in the unit home management and in the sixth unit subject matter on present lifestyle and Yoga is included. Illustrations and drawings are also provded to make the subject interesting and conceivable. A summary of each chapter. With technical terms in Hindi and English are also given. Each chapter has different types of questions at the end such as objective, fill in the blanks, short-answer questions, and essay-type questions. To develop the quality of 'learning by doing', subject-matter related practical with instructions are also given in simple language.

Efforts have been made to keep the language and phraseology lucid and understandable. We trust that this book will be useful not only to students of class XI but also to homemakers. We invite constructive feedback and suggestions from teachers and students of Home Science in making this book more useful.

Dr. Bharti Bhatnagar
Convener and Dean
Home-Science College, Swami Keshwanand
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Syllabus

Home Science

Subject Code : 18

Time 3.15 Hours Marks 70

S.No.	Learning Area	Marks Weightage
1.	Idea and scope of Home Science	04
2.	Human development and family relations	18
3.	Family Nutrition	18
4.	Textile and Garment	13
5.	Home Management	13
6.	Present lifestyle and Yoga	04

S.No. Unit Theoretical Marks Weightage

1. I Idea and scope of Home Science 04

(i) Meaning, Importance and Utility
(ii) Famous scientists and their contribution

2. II Human development and family relations 18

(i) Concept of human growth and development
(ii) Pregnancy
(iii) Maternal and newborn care
(iv) Development from infancy to childhood -I
(v) Development from infancy to childhood –II
(vi) Immunity (Vaccination)
(vii) Common diseases of children
(viii) Optional care of children

3. III Family Nutrition 18

(i) Interrelation between food and health
(ii) Functions of Food
(iii) Nutrients of Food- macronutrients
(iv) Nutrients of Food- micronutrients
(v) Balanced Diet and food groups
(vi) Culinary skills and increasing food nutrition
(vii) Food preservation
(viii) Cold beverages, convenience and instant foods

4.	**IV**	**Textile and Garment** (i) Fiber Science (ii) Spinning and thread making (iii) Weaving of textiles (iv) Textile finishing (v) Dyeing and printing	**13**
5.	**V**	**Home Management** (i) Resources and Management (ii) Time and Energy Management (iii) Tools to save time and labor (iv) Home activities, space management and Decoration (v) First aid (vi) Home Care	**13**
6.	**VI**	**Present lifestyle and Yoga** (i) Importance of Yoga (ii) Effect of Yoga on physical and mental health (iii) Important Yogasana	**04**

Home Science Practical

Time: 5 Hours Marks: 30

S.No.	Learning Area Practical	Marks Weightage
1.	Idea and scope of Home Science	-
2.	Human development and family relations	4
3.	Family Nutrition	8
4.	Clothing and Apparel	6
5.	Home Management	5
6.	Present Lifestyle and Yoga	-
	Record and Oral	5 +2

S.No.		Experimental Chapters	Marks
1.	**I**	—	
2.	**II**	**Human development and family relations**	**04**
	(i)	Lists of vaccination	
	(ii)	Interview and sightseeing of crash cart, *Aaganwadi* and nursery school and generating Report- for working women	
	(iii)	Inspection of 1-5 & 6-10 year old boys in the neighborhood and preparing a report	
3.	**III**	**Family Nutrition**	**08**
	(i)	Preparing low cost and more nutritious food and organizing competitions	
	(ii)	Preparing foods using different recipes	
	(iii)	Preparing food products using food preservation methods	
4.	**IV**	**Clothing and Apparel**	**06**
	(i)	Identifying different types of textiles (clothing)	
	(ii)	Making and identifying different types of Weaving	
	(iii)	Preparing samples of *Bandhej*, block and printing	
5.	**V**	**Home Management**	**05**
	(i)	Home decoration- flower decoration and floor decoration and organizing competitions	
	(ii)	Preparing first aid kit and giving first aid during accidents	
		Record	05
		Oral	02

Prescribed Book-

Home Science-1 –Secondary Education Board, Rajasthan, Ajmer.

INDEX

Theoretical Chapters

UNIT : I
CONCEPT AND SCOPE OF HOME SCIENCE

CHAPTER : 1
MEANING, IMPORTANCE AND USEFULNESS

The name **'Home Science'** itself suggests that it is concerned mainly with home and includes health and happiness of each and every person residing in it. It is an interdisciplinary field of science that equips its students for multiple vocational and career options. Home Science being a very vast field, is defined differently by various authors, practitioners and researchers. In simple words, Home Science can be defined, as "a multidisciplinary field of study that deals with health, diet, care of child, textile and garment designing, managing resources and other subjects concerned with a home."

During the first All India Women's Conference (1932), held at Lady Irwin College, New Delhi, Dr. A. H. Richard defined Home Science as "A multi-dimensional subject dealing with income and expenditure of family, cleanliness of food, adequacy of clothing and management of home with suitable resources." Home Science is a practical science, which prepares the students help to lead their family lives successfully and also help to solve social and economic problems easily. According to The Lake Placid Association, Home Science is the study of those principles, conditions and ideals which are concerned, on the one side, with immediate and physical environment of man and on the other, with his human nature.

The scholars of of Home Science have defined Home Science while synthesizing ideas on the basis of their own experiences. According to Dr. Rajammal P. Devdas, Home Science includes human environment, family, nutrition, resource management, human development, science for improving consumer capacity and humanities.

Home Science is known by different names across the world, Domestic Art, Household Science, Household Art, Household Economics, Household Administration, Domestic Science, etc. In America, it is famous by the name of Home Economics while in England and India by Home Science.

According to Verma (2000), Home Science is focused on the adjustment of scientific and practical knowledge to develop the individual, family, community and nation.

The idea or concept of Home Science is based on the strong desire of improving community through households which can be achieved by systematic management of resources. Home Science can play an important role in the development of personality of an individual.

The modern idea of Home Science is to create a home where peace, prosperity and progress prevail. One factor which affects the idea of Home Science is

that of awareness towards issues of women. To both Modern Home Science gives equal opportunities to both genders to have good family and professional lives. Along with the material and economic achievements, upliftment of physical, spiritual and moral aspect of the family is also important. This is one of the fundamental principles of Home Science. It also implants moral values like honesty, truthfulness, dependency, and impartiality in the household.

OBJECTIVES OF HOME SCIENCE

1. To practise scientific principles in daily life' by developing knowledge, skills and strength in students.
2. To develop an understanding of requirements, problems and solutions of family and community life
3. To enhance qualification and expertise of students to achieve a better improved standard of living.

SCOPE OF HOME SCIENCE

There are five different areas of specialty in Home Science. Every branch provides graduation syllabus and facilities for research. The five departments with their subjects are as follows:

1. **Human development**- Human development is related to the study of developmental process starting from conception, going up, to old age. Physical, mental, emotional, language, cognitive, ethical and social development are also included. Problems related to the behavior of children, abnormal children, anomalies, factors affecting human development are also studied as a part of this branch. With the study of these aspects, a homemaker can keep a watchful eye on her children's health and other development related dimensions. Thus, she can play an important role in making children healthy, and socially and responsible citizens.
2. **Family Resource Management**- Under the branch of Family Resource Management, time, money and space management are included. For time management, a good time planning is of utmost importance. For money management proper use of resources is done by preparing a family budget. By studying this subject, a person can use the time, labor, money and the available resources to the optimum in taking care of his family, decorating the home and for maintaining cleanliness of the environment. Consumer education is also a part of this subject. Information regarding food safety, awareness against adulteration, health hazards and Consumer Protection Act, main principles and basic knowledge of design and art are also an integral part.
3. **Food & Nutrition-** In the branch of Food & Nutrition, food science and nutrition are included. In food science, properties of food, protection of nutrients, sources of nutrients, nutrient value of food and preparation of various food, combinations etc are the main points. Food & Nutrition provides information about various nutrients, their structure, functions, sources, requirements, and deficiency. Education related to different physical stages of human life like pregnancy, infancy, childhood, adolescence, the motherhood, old age, and food related requirements and changes are given under this branch.

   In addition to this, knowledge about storage and preservation of food products, nutrition related problems of the community and

information regarding different nutrition programmes are also imparted.

4. **Textile Science**- In Textile Science, fibers, thread, weaving of different textiles and specialty of different textiles is studied. Fundamental principles, design and manufacturing of garment is also taught.

5. **Home Science dissemination and communication management**- Main principles of programme planning, use of audio-visual aids, social work, development of society and different forms of conversation are included in this branch. Disseminating knowledge on various subjects to rural community based on their requirements is also its objective.

Importance of Home Science

Knowledge, understanding, skills, cultural and spiritual values obtained from Home Science helps people lead a satisfactory personal, domestic and community life. Contrary to other subjects, home science is practical knowledge that can be used in day-to-day life. Home science gives an opportunity for showcasing one's capacity to be a leader.

Home science education develops in an individual the quality of becoming a responsible citizen. It provides information related to the importance of food for leading a healthy life. It also, It provides solutions to problems related to family life. Home science education is auxiliary to self employment. Knowledge gained from various branches of Home Science can be used by a student for personal and occupational benefits.

Usefulness of Home Science

Home science education has established itself as an important employment domain in the field of education and research. Nursery school, family planning agencies, family counselling centres, pre-elementary education training centres, agricultural research centres, social welfare department, UNICEF, FAO, CARE, etc are some organizations where graduates and post graduates of Home Science can find employemnt. Nutrition consultant, dietician, food expert, and National Nutrition organization are some of the career opportunities. Home science also provides more possibilities of self employment. Fashion designing, sewing centre, nursery school, toy industry consultant, catering unit, family counselling centre, food processing centre, are some of the other areas where Home Science graduates can seek employment.

IMPORTANT POINTS :

1. Home science is interdisciplinary field of science that provides students with multiple vocational and career options.
2. Home science is known by various names such as Domestic Art, Household Science, Household Art, Household Economics, Household Administration, etc.
3. To both genders modern Home Science gives equal opportunity to have good family and professional lives.
4. Home science increases qualification and expertise of students by developing knowledge, skills and strength for meeting the requirements, understanding problems and seeking solutions of family and community life to achieve a letter standard of living.
5. Five branches of Home science are Human development, Family Resource Management,

Food & Nutrition, Textile Science and Home Science dissemination and communication management.

6. Students of Home Science can find employment in nursery school, family planning agencies, family counselling centres, agricultural research centres, fashion designing etc.

EXERCISE :

1. Choose the correct option:

(i) Home Science is-

(a) Practical science (b) Family science

(c) Art science (d) All of these

(ii) Which of the following is studied in the branch Family Resource Management of-

(a) Culinary skills

(b) Fashion designing

(c) Family planning

(d) Time, money, energy

(iii) Home science was defined during the first All India Women's Conference (1932) by

(a) Dr. A.H. Richard

(b) Dr. G. Subbulakshmi

(c) Flemmie Pansy Kittrell

(d) Both (b) and (c)

(iv) Which of the following is not a branch of Home Science-

(a) Human development and family relations

(b) Engineering department

(c) Dissemination and communication management

(d) Textile science

2. Fill in the blanks-

(i) Home Science has ……branches.

(ii) Human development is related to the development from ……. To ……. .

(iii) Home science education is auxiliary to …….

3. Define home science.

4. Describe the objectives of Home Science and any two branches in short.

5. Throw some light on importance and concept of Home science education.

Answers:

1. (i) d (ii) d (iii) a (iv) b

2. (i) five (ii) conception, old age

(iii) self-employment

CHAPTER : 2

FAMOUS SCIENTISTS AND THEIR CONTRIBUTION

1. **Dr. Ellen H. Richard** - Dr. Richard was an American Industrial and Environmental chemist during the 19th century. Her pioneering work and experimental research in sanitary engineering and Home Science laid the foundation of a new science 'Home Economics'. She was the founder of Home Economics movement and used the science in her own home. She used chemistry in the study of nutrition.
2. **Dr. S. Anandalakshmi**- Dr. Anandalaksmi did her doctorate in Human Development from the University of Wisconsin. She worked in the 'Vidya Mandir' of Chennai as a part of an innovative school for primary education. She taught at the Lady Irwin College and started the Child Development Department (Post Graduate). She voluntarily worked with SEWA, Ahmadabad, SKWC Barefoot College and Bal Mandir. Her publication mainly dealt with cognitive development, social development, research methods and Indian cultural aspects. She has also written book on education, Child Development and Family Relations.
3. **Rajammal P. Devadas-** Rajammal P. Devdas was an Indian nutritionist, educationist and was former vice Chancellor of Avinashilingam Institute for Home Science. She was a member of the State Planning Commission of Tamil Nadu, Tamil Nadu Commission for Women and the elected Vice President of the World Food Conference. The Government of India awarded her the fourth highest civilian honour of the Padma Shri in 1992.
4. **Dr. G. Subbulakshmi**- Dr. G. subbulakshmi is an eminent nutritionist with an experience of 45 years in the field of education, research and administrative work. She has been conferred with many awards for her commendable work in the field of nutrition. She has worked as a specialist with the Urmul dairy, Heinz India, Hindustan Lever, ICDS, Indian Agriculture Research Institute etc.
5. **Flemmie Pansy Kittrell-** Flemmie Pansy Kittrell was an internationally acclaimed nutritionist but her main focus was on child development and family welfare. In her 40 years of teaching, she travelled to many developing countries to bring about an improvement in family conditions. She was the First African-American woman to receive a Ph.D. in nutrition. She attracted limelight on the role of women in world and always encouraged women for higher education.
6. **Dr. M.S. Swaminathan**- Dr. Swaminathan is renowned for his leading role in India's Green Revolution. He is known as "Father of Indian Green Revolution" for his developing high-yielding varieties of wheat and rice in India. His vision is to rid the world of hunger and poverty. He has also worked for sustainable agriculture, sustainable food security and the preservation of biodiversity.

UNIT : II
HUMAN DEVELOPMENT AND FAMILY RELATIONS

CHAPTER : 3
CONCEPT OF HUMAN GROWTH AND DEVELOPMENT

Development Psychology deals with the study of development from conception of child to old age or in other words, it is the study of lifelong physical, mental and behavioral development. The process of development takes place in some or the other form beginning from conception to death. In simple words, Development is related to qualitative changes in the body. Growth is related to the quantitative changes such as increase in weight, height, size of body etc.

Definition of Growth- General meaning of growth is 'increase' or expansion. Growth refers to structural physical changes which occur in a sequence as a person matures. That is to say growth is progressive elongation. Therefore, it represents growth in height, size and weight of an individual.

Definition of Development- Development deals with an individual's development starting from conception to death in an inter-disciplinary perspective. In this way, three elements are of prime importance in the above mentioned definition of development:

1. Human development is an individual experience.
2. It is a continuous process.
3. It is an inter-disciplinary study.

Development hints not only towards physical growth but also mental, social, intellectual, psychological, emotional changes. For example, during infancy, increase in weight occurs due to growth of nerves, glands and muscle tissues.

Difference between growth and development:

The fundamental difference between growth and development is as follows:

	GROWTH		DEVELOPMENT
1	Growth is quantitative change.	1.	Development is a qualitative change.
2.	Growth is concrete.	2.	Development is abstract.
3.	Growth can be measured. Size, weight, height can be measured.	3.	Development cannot be measured but can be experienced.
4.	Growth is internal or external physical change.	4.	Development can be physical, mental, intellectual, emotional, and psychological.
5.	Growth begins from conception and ends towards matured age.	5.	Development begins from conception and goes on lifelong.

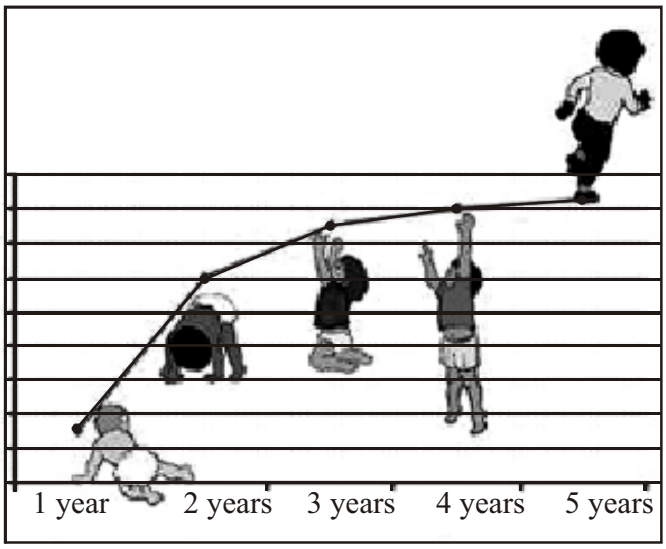


Figure : 3.1 Growth and Development

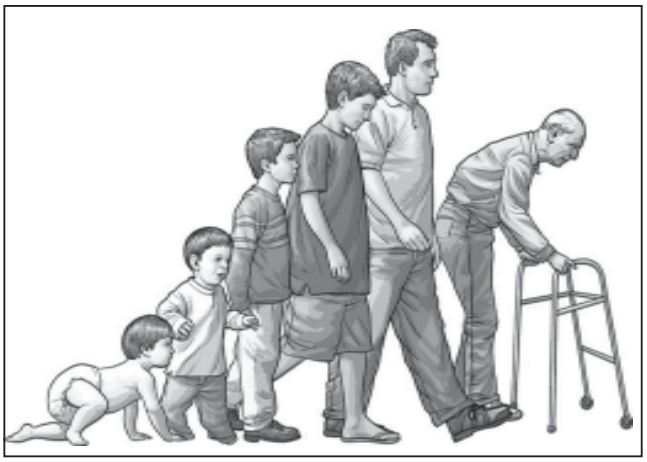


Figure : 3.2 Human Stages of Development

Stages of Development

Under the life-wide interpretation of human development approach, development is divided into various phases. Main stages of development and their duration are given in table 3.1:

Table 3.1

STAGES	DURATION
1. Gestational age	Conception to birth
2. Infancy	Birth to 2 years old
(a) Neonate :	Birth to 2 weeks
(b) Infancy	2 week to 2 years
3. Childhood	2-12 years
(a) Early childhood	2-6 years
(b) Later childhood	6-12 years
4. Adolescence	
(a) Pre-adolescence	11-12 to 13-14 years
(b) Adolescence	13- 17 years
(c) Later- adolescence	18-21 years
5. Early Adulthood	21-40 years
6. Middle Age	40-60 years
7. Old age	After 60 years
8. Death and bereavement	End of life

Principles of Development

1. **Development involves changes** - Development is a long series of changes which on undisrupted from conception to the end of his life. In the process of development, physical, mental, intellectual, social and emotional changes occur.
2. **Development is sequential-** Whether it is an animal or a human, development has a fixed format. Physical development of an individual takes place in two directions:
   (a) In this order physical development takes place from head to feet. In other words, first development is in the brain and then the body, stomach, towards the back. At the end are the feet.
   (b)

3. **Development is a result of maturity and learning-** Physical and mental development is a result of both learning and maturity. Maturity lays the foundation of learning.
4. **Early development is more important than the later development-** On the basis of developmental studies it is clear that the development that takes place early in life is far more important than that taking place in later life. Initial conditions affect the foundation of development. The environment of a child has a considerable effect on the development of his genetic potential. The main conditions are- favorable interpersonal relationship, positive emotional conditions, way of training a child, impact of playing a role, family structure, environmental stimulation, etc.
5. **Development proceeds from general to specifie-** Developmental responses move from simple to complex. The entire foetus is movable yet he cannot move a part by himself. Before lifting something with his hand, a child lifts the hand again and again.
6. **Development is continuous-** Development deals with an individual's development, starting from conception to death in which slow or rapid changes takes place. According to Pikovsky (1968), development is not same every time instead it has some phases of balance as well as imbalance. There are obstructions too in the process of development. This can be found at one level or at many levels.
7. **Different parts grow at different rates in developmental process-** Though different physical and mental capacities develop constantly however every part does not grow with same speed. Maturity develops in different parts at different times. Like in adolescence hands-feet and nose are completely developed but the lower part of face and development of shoulder takes place at slow speed.
8. **Development in inter related** - It is a general belief that deficiency in one development side is compensated by the higher development of another capacity. For example, an intelligent boy can be physically weak. When physical development takes place at a rapid speed, then mental development too takes place rapidly. There are individual differences in development.
9. **Development has individual differences-** Though the development form is found to be same in all children however the speed and behavior of development varies. Development takes place slowly in some while in others it occurs at a rapid pace. Thus, all children cannot attain the excellence of development at the same age. The differences in development are due to many factors. For example physical development, partially on genetic potential and to some extent on other environmental factors like food, health, fresh air and light, emotions and physical fatigue also decides development. In the same way mental development depends on internal capacities as well as emotional conditions, encouragement, learning opportunities, strong motivation etc.
10. **Definite periods in developmental pattern-** Though development is continuous yet its speed is slow in some phase and fast in other. Vijoy suggests that these periods can be distinguished not only on the basis of age but also on the basis of biological incidents and other changes

in an individual's behavior.

11. **Social expectation for every development period -** Generally it is seen that some social behavior and skills are learned more successfully at a particular age than at some other age. Therefore, society expects that an individual develops according to the fixed timetable. These social requirements are also known as developmental tasks. Havighurst (1995) has defined developmental task as "A developmental task is a task which is learned at a specific point and which makes achievement of succeeding tasks possible. When the timing is right, the ability to learn a particular task will be possible." Some of these tasks are achieved because of maturity while others due to social, cultural pressure, like learning appropriate sexual roles or learning the style of reading and writing.

IMPORTANT POINTS:

1. Growth refers to structural physical changes, like growth in height, weight and size of a person.
2. Development includes qualitative changes like social, mental and intellectual development.
3. Growth and development differ from each other significantly. Like, growth is concrete which can be observed while development is abstract which cannot be observed.
4. There are 8 salient stages of development.
5. Many rules are included in the rules of development, like, it is variable, occurs in a definite sequence, it is a result of maturity and learning. In this the early development is more important than the later stage development. Development is simpler to complex. Continuity is found in development, etc.

EXERCISE:

1. Choose the correct option:

(i) ———— is qualitative.

(a) Growth (b) development

(c) Belief (d) (a) and (b) both

(ii) The age of 3-12 years is known as

(a) Gestational period (b) infancy

(c) Adolescence (d) childhood

(iii) Development is a result of

(a) Age (b) learning

(c) Maturity (d) (b) and (c) both

(iv) The duration of developmental forms is

(a) Definite (b) indefinite

(c) Infinite (d) none of these

2. Fill in the blanks

(i) ———— are found in development.

(ii) The process of development takes place from ——— to ————

(iii) ———— is a lifetime process.

(iv) The stage from conception to birth is called ———— stage.

3. What is developmental task?
4. Differentiate between growth and development.
5. Describe the importance of development.
6. Explain the stages of development.
7. Describe briefly the rules of development.

ANSWERS

1. (i) b (ii) c (iii) d (iv) a
2. (i) Individual differences, (ii) Conception, death, (iii) Development (iv) Gestational

CHAPTER : 4

PREGNANCY

Symptoms and signs of pregnancy

The gestational period or duration of pregnancy is 9 months and 7 days. The gestational period is counted from the last day of menstrual cycle till the day of childbirth. Human fertilization is the union of a human egg and sperm and the egg is known as fertilized egg. This fertilized egg undergoes quick division and undergoes growth and development. When this fertilized egg gets implanted in the uterus and starts receiving nutrition from mother's placenta then the signs of pregnancy start appearing.

Symptoms and signs of first 5 months

1. A late period
2. Morning sickness- dizziness and vomiting
3. Urge for more sleep- Because of hormonal changes and onset of new activities in the body requires additional rest and sleep.
4. More secretion of saliva- More saliva secretion at the sight of sweet and sour food.
5. Experiencing laziness and lethargy
6. Frequent urination- A growing uterus puts more weight on the bladder leading to frequent urination.
7. The movement of the womb- This is experienced during 16-18th weeks. The mother can experience the movement of foetus' arms and feet.
8. Enlargement of stomach- Due to growth of uterus stomach too grows in size.

The signs of first 5 months as known by a doctor

1. **Changes in breast**- The size of breasts increases. In the 4th month, nipples and areolas will probably become darker.
2. **Changes in shape, size, and location of uterus**- Uterus become spherical compared to normal shape. The front and middle part of the uterus reaches the umbilicus by the 4-5th month of gestational period.
3. **Signs generated due to presence of a foetus**- The foetus develops by the 4th month and starts movement which the mother can feel. Amniotic fluid increases in the uterus as the foetus grows in size. The heartbeats of the foetus can be heard through a stethoscope.
4. **Vagina turns blue**- From the second month of pregnancy vagina may take on a blue color which increases to its maximum when the time of childbirth approaches.
5. **Changes in skin**- The face of the pregnant lady turns yellow and the skin below eyes and above the lips grow darker in color.

Symptoms and signs of last 5 months-

1. The self-activity of foetus continues while the mobility of foetus increases continuously.
2. The weight of breasts goes on increasing.
3. Due to increase in blood pressure the muscles of legs contract and swell.
4. During the last 2-3 months the pregnant lady may experience difficulty in breathing due to excessive pressure on the diaphragm.
5. Uterine contraction occurs.

Internal physical changes during pregnancy

1. **Changes in metabolism-** The body of the mother require more nutrition, foetus requires more nutrition due to breastfeeding, growth and development in uterus causes metabolic changes. Stomach secretions reduce as a result of which food stays a bit longer in the stomach. Intestinal muscles relax in the presence of progesterone hormone. Constipation, vomiting, nausea are common problems.
2. **Changes in urinary tract-** Blood circulation towards the kidneys increase and so the kidneys have to work more. The glomerular filtration rate increases by 50%, as a result more urea is removed. Because of this, the rate of glucose re-absorption decreases and more glucose is ousted with the urine. Because of excessive progesterone secretion urinary tract swells and grows curvy.
3. **Changes in blood circulation-** Due to increase in blood in the body, the heart has to work more. Volume of tissues increases. The hamoglobin percentage in blood decreases. Blood pressure too increases by the 4-5th month. Due to increase in blood pressure, blood vessels in the legs undergo inflammation.
4. **Respiration related changes-** The growing uterus exerts pressure on muscles as a result respiration becomes difficult.
5. **Hormonal changes**- Adrenocorticol hormones and thyrotropin becomes more active during pregnancy. Corticosterone hormone is secreted in excess from the adrenal glands as result some marks appear on stomach. Breathing becomes shallow due to presence of progesterone hormone in the blood. Thyroid gland too grows in size.
6. **Changes in vascular system-** Due to changes in vascular system, the expecting mother experiences stress, fear, anxiety, headache, etc.
7. **Changes in vaginal tract, cervix and uterus-** Hormones affect the reproductive organs. Estrogen causes the mucosa of vaginal tract thicker and the color turns blue. Blood vessels increases in cervix and cervical connective tissue becomes more receptive.
8. **Changes in abdomen and pelvic joint-** Growth of stomach cause the skin to stretch whereby the skin becomes flexible and breaks. As a result, wrinkles appear on stomach.
9. **Changes in muscular and skeletal system-** Motion of voluntary muscles reduce. Muscles of back and waist stretch. Stress is experienced by the muscles of rectum resulting in swelling of anal veins. This can cause hemorrhoids.

Fertilization

Developmental process starts with fertilization and the zygote so formed as a result of fusion of ovum and sperm, which after a fixed duration forms an entire human, stores the coded genetic information.

Stages of gestational development (figure 4.1)- the period of gestational development is 9 months which is divided into 3 stages-

1. **Zygote formation –** This stage starts with the fusion of an ovum and sperm forming a zygote. It lasts for two weeks. The internal part of zygote undergoes constant cell division as a result the number of cells goes on increasing. After fertilization, for 7-8 days, the fertilized egg floats in the fluid present in mother's uterus. After 10 days, the conceptus adheres to the wall of the uterus which is called implantation. From the first group of cells the body is developed, from the second group of cells umbilicus and placenta develops and the third cell group takes the form of transparent membranes. Inside these membranes the unborn baby develops and grows and stays protected.
2. **Embryonic period –** In this stage the process of development starts. This begins from the third week and continues until the end of the 10th week of gestation. The growing multicellular organism is called embryo. The structural development of the foetus is completed in this period.

(a) **Outer membrane-** This is the outermost membrane of the foetus from which hairs, nails, skin, teeth and vascular system of the baby are fabricated.

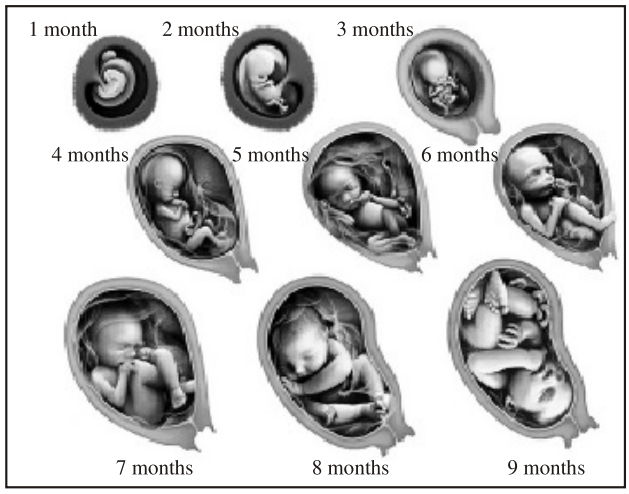


Figure : 4.1 Stages of gestational development

(b) **Middle membrane**- From this membrane the middle part of skin and muscles are fabricated.

(c) **Inner membrane-**All the vital organs (lungs, brain, liver, digestive system) are fabricated. With the end of embryonic period the foetus grows up to 1-1/4 inches to 2 inches and has a mass of 15-20 grams. The heartbeat of the baby starts and umbilical cord is developed till the end of this period.

3. **Period of foetus**- This stage is from 3rd month until the baby is born. In this period various organs and muscles of the baby are fully developed and all the organs become functional. Height, size, shape, and weight grow rapidly.

3rd month- In this month the baby looks like a stumpy semicircle. The spinal cord begins to form. The body grows in height and by the end of month hands and feet begin to grow. Pink skin starts forming. The size of the head is 1/3rd that of body and kidneys begin to function. The face too starts developing. External ears, eyelashes are formed and hands continue growing. Height is about 6-8 cm and weight ¾ ounces. Nutrition is supplied by umbilical cord. Uterus grows in size.

4th month- Head grows bigger in size. Hair too begin to grow. Back of the foetus is arched and nails in hands and feet, teeth in gums begin to develop. Reproductive organs also develop in this month. By the end of this month internal organs begin their functions. Height is 11-12 cm and weight grows up to 100-110 grams.

5th month- Heartbeat becomes distinct. Muscles become active thus becoming more functional. Height is 18-20 cm while weight becomes 280-300 grams.

6th month- Soft hair begin to grow on skin and a white cream like sticky, oily fluid called vermix starts depositing on the skin. Mother begins feeling the baby's movements. The eye lashes grow separately. Head grows rapidly. By the end of the month, the foetus grows up to 30-32 cm in height and weight is 600-750 grams.

7th month- The baby is fully developed in this month. Nails in fingers are completely developed. The foetus takes up a single position and activity of the baby decreases. The height grows up to 15-16 inches and weight up to 1.5-2 kg.

8th month- Eyes are fully developed, retina is fabricated, respiration begins and fat on skin and body starts accumulating. The baby attains full maturity.

9th month- Colour of the skin becomes natural. Hair grow. Lips turn thin and pink. Fatty tissues grow quantitatively. By the end of 9th month weight becomes 3.0-3.5 kg and height up to 18-20 inches. Contractions begin at the end of this month. Before birth the baby slowly shifts towards lower part of the uterus.

Factors affecting gestational period

1. Nutrition of expecting mother
2. Health of the mother
3. Consumption of drugs and alcohol
4. Emotional feelings of mother
5. Age of mother-father
6. Attitude of mother-father

Complications of pregnancy

1. Nausea
2. Constipation
3. Chest burn
4. Indigestion
5. Insomnia
6. Hemorrhoids
7. Muscle fatigue
8. Frequent urination
9. Back pain
10. Physical inflammation
11. Vein swelling
12. Vaginal secretions
13. Short breath
14. Anorexia or extreme love for food

Care of pregnant lady

Diet- Diet is of extreme importance during pregnancy. Consumption of balanced diet is best for the health. In this condition, additional food elements (carbohydrates, protein, vitamin, minerals) are also required.

The balanced diet of a pregnant woman should include foods that are rich in carbohydrates, protein, fats, vitamins, minerals (calcium, phosphorus, iron, iodine), water and fiber such as cereals (rice, wheat, millet, barley, maize, ragi, etc), milk, milk products, cottage cheese, pulses, curd, eggs, fish, soyabean, groundnuts, dry fruits, oil, butter, coconut, oil seed, papaya, mango, carrot, green leafy vegetables, jaggery, turnip, turmeric, banana etc.

- Pregnant mother should take short meals 5-6 times a day instead of one or two time full course meals.
- Spicy, oily, stodgy food
- Green leafy vegetables, unpeeled fruits, yellow vegetables, salad, milk, buttermilk etc, should make a major portion of the balanced diet.
- Intake of water should be more.
- Shelled lentils, bran flour, sprouted grains solve the problem of constipation.
- Dinner should be consumed 2 hours before the sleeping time.
- Stale and stodgy food should be avoided.
- Rest and sleep should be adequate and regular so that physical activities can be carried out easily and blood circulation stays smooth.
- Light exercise should be done.
- Fresh air and sunlight should be taken adequately so that mental peace as well as physical health is maintained.
- Clean body, environment, food, clothes should be maintained.
- Mental health should be well taken care of. Pregnant mother should remain happy, tension-free, and positive and should go for a walk in open space in fresh air.

IMPORTANT POINTS:

1. The gestational period is 9 months and 7 days. The gestational period is counted from the last day of menstrual cycle till the day of childbirth.
2. A late period, morning sickness, urge for more sleep, frequent urination, enlargement of stomach etc are some of the symptoms of first 5 months of pregnancy.
3. Growth in self-activity of foetus, increase in weight of breasts, contraction in muscles of legs and uterus etc are some of the symptoms of the last 5 months of pregnancy.
4. Changes in metabolism, urinary tract, blood circulation, respiration, pelvic joints etc are some of the internal changes in pregnancy.
5. Three stages of pregnancy- zygote formation, embryonic stage, and foetus.
6. Nutrition, health of expecting mother, consumption of drugs and alcohol, emotional feelings of mother, age of mother-father affects the gestational development.
7. Insomnia, hemorrhoids, back pain, inflammation, short breath, constipation, chest burn, vomiting etc are the hardships of pregnancy.
8. For the good health of baby and herself mother should take a balanced diet.

EXERCISE:

1. Choose the correct option:

(i) The gestational period is

(a) 10 months 2 days (b) 9 months 7 days

(c) 8 months (d) 7 months

(ii) The initial symptom of pregnancy is

(a) Urge to sleep more

(b) late period

(c) More saliva secretion

(d) frequent urination

(iii) Mother gets the indication of foetus' presence in

(a) 3rd month (b) 7th month

(c) 4th month (d) 6th month

(iv) The first stage of gestational development is

(a) Embryonic stage (b) foetus

(c) Implantation (d) zygote formation

(v) Implantation in pregnancy is

(a) Formation of gums in foetus

(b) adherence of foetus to uterine wall

(c) Placenta

(d) formation of organs and muscles

(vi) In which month is gender decided

(a) 2^{nd} month (b) 4^{th} month

(c) 5^{th} month (d) 6^{th} month

(vii) Factors affecting gestational development

(a) Nutrition of mother

(b) attitude of mother father

(c) Consumption of drugs and alcohol

(d) all of these

(viii) Weight of child at the time of birth should be

(a) 2.5-3.0 kg (b) 3.0-3.5 kg

(c) 5.0-6.0 kg (d) 4.0-4.5 kg

2. Fill in the blanks

(i) The shape of uterus becomes———— compared to a normal woman's uterus.

(ii) During pregnancy, after implantation foetus receives nutrition from ————-

(iii) Heartbeat of a foetus can be heard using ————-

(iv) Due to increase in ————————, blood vessels in the legs undergo inflammation.

(v) Presence of ———— hormone causes relaxation of intestinal muscles.

3. What are signs and symptoms of first 5 months of pregnancy?

4. What are the internal changes during pregnancy?

5. What are the changes in blood circulation during pregnancy?

6. What is zygote formation?

7. Explain in detail embryonic stage.

8. Explain stages of development during gestation period.

9. Write in detail the factors affecting the gestational development.

10. How can care of a pregnant mother be taken? What are the hardships of pregnancy?

ANSWERS

1. (i) b (ii) b (iii) c (iv) d

(v) b (vi) b (vii) d (viii) b

2. (i) Enlarged (ii) Mother

(iii) Stethoscope (iv) Blood pressure

(v) Progesterone

CHAPTER : 5

MATERNAL AND POST-NATAL CARE

Care of the mother

The immediate care of a newborn child is done by the doctor nurse or a trained midwife. Following this care of mother becomes necessary. Being in labor, the woman gets lethargic and weak. She feels sleepy or fainted and so she is given hot milk or tea. Thereafter she should be allowed to take a good sleep.

During gestation period, pregnancy related organs undergo considerable changes which take time to come back to their natural form. After childbirth mother needs a lot of rest. During pregnancy the weight of uterus becomes as high as 1kg which is 40-50 gm more than the original one. It takes uterus almost 40 days to lose this extra weight and so the mother is advised to take more rest. For the next 20-30 days, blood loss is even more, so the mother should take nutritious food along with taking care of personal hygiene such as wearing clean clothes, using clean napkin etc.

In addition to this, mother should not do laborious work such as lifting weight, water-filled bucket etc.

Sometimes mother's urinary bladder gets infected causing fever. After childbirth digestibility weakens and so the first day mother is given vitamin, mineral- rich kedgeree, porridge, milk, vegetable soup, lentils or other solid food to eat.

In case of normal delivery, mother is given celery, jaggery water, almond-poppy seed pudding (*halwa*), gond ke ladoo, and laddoo made from dry fruits-methi-jaggery-ghee to eat but spicy, fried, roasted, stale, sour, stodgy food is avoided. The mother should eat 5-6 short meals during the day and take rest for at least 40-50 days.

Necessary preparations for delivery time

1. Selection of a proper doctor
2. Selection of a suitable place for delivery
3. Selection of midwife or nurse to take care immediately after childbirth.
4. Keeping clothes and other essentials ready for the mother
5. In case of delivery at home, selection of a trained midwife
6. Arranging essentials for the newborn baby

Care of the newborn baby

Neonate or Newborn baby- The foetus born from the mother's body is known as a neonate. Lot of caution and patience is required to take care of the newborn. Dealing with the child should be tender. The child stays in the womb for 9 months where he gets suitable protection and temperature.

Physical activities of the newborn after birth

1. Pulmonary respiration
2. Beginning of digestion
3. Establishment of changes in blood circulation
4. Temperature control
5. Develops disease resistance

Artificial nourishment of baby

Mother's milk is nectar (Amrit) for baby's life. No milk is better and superior for the baby than the mother's milk. It is microbe-free, always available, unrefined with less renal solute and more goodness. While breastfeeding one hand should be kept in such a position that it supports child's neck. Make sure baby's nose is not pressed to avoid any difficulty in breathing. After the baby drinks the milk, mother should gently hold the baby over shoulder and rub her hands on baby's back to cause belching which removes air from alimentary canal of the baby and thus, the milk gets digested easily. Mother should be happy while breastfeeding and be careful and lovable at the same time. In some cases when mother cannot breastfeed, the baby has to depend on milk of cow, buffalo, goat or preserved bottle milk.

Figure : 5.1 (Breast Feeding)

The milk other than mother's milk which is given as nourishment to the baby is called formula. From the point of nutrition and digestion cow's milk is best for the baby but when cow milk is not available then milk of buffalo, goat or milk powder can be given.

Fundamental principles to prepare formula

1. Milk should be fresh, clean and microbe-free.
2. When formula is prepared, care should be taken to see that it fulfills the need of baby's weight, energy and strength.
3. It should be digestible.

Figure : 5.2 (Preparing Formula)

Cleaning of bottle

For cleaning purpose a wide mouth bottle should be used. Disinfection by proper cleaning of bottle and nipple is very important. Bottles can be cleaned by scrubbing with a brush using detergent or soap with water. After this, bottle should be disinfected by boiling it in covered boiling water.

Nipple

1. Nipple should be washed immediately after milk is fed to the baby.
2. Inside and outside of nipple should be cleaned by scrubbing with a brush.
3. Nipple should be washed in hot water and not in boiling water.
4. Washed nipple should be kept in wide mouth bottle, jar or covered plate to keep it contamination free.

Figure : 5.3 (Cleaning the bottle)

Method of feeding from the bottle

1. Child should be fed from the bottle in the same way as breastfeeding.
2. Hold the baby in lap and lift the head up.
3. Milk should be fed as long as the baby wants. Once the baby drinks milk to full capacity, he himself will stop drinking.
4. Wipe the face of baby and hold the baby over shoulder, rub hands on baby's back for 10-15 minutes to cause belching.

Baby shower

Bathing and hygiene of body parts for the baby is very important. Bathing opens the pores of skin from which contaminated material is ejected easily.

Method of bath

Keep important articles such as bath tub, boric lotion, oil, towel, clothes, powder etc ready so that bathing is not disrupted. Before taking the baby for bath check the temperature of water. Water should neither be hot nor cold. Check the water either by dipping the elbow in it or using a thermometer.

Figure : 5.4 (Bathing)

Oil massage should be done before taking the baby for bath. While bathing massage the soap on baby's body using a soft cloth and then rub the soap with hands. Gently rub the soap behind the ears, under the arms, on the neck, elbow, thighs and legs. Lay the baby on stomach and clean the backside of body. Now slowly hold the baby with both hands and put the baby in bathtub. Lift the shoulders with left hand and support the head on left arm. Support the back using right hand. Keeping the baby in this position, wash off the soap from the body. Thereafter wipe the body with towel, apply lotion and make the baby wear clothes.

Excretion

Initially the bowel muscles contract being uncomfortable before excretion. This is the early sign of defecation. The baby defecates immediately without

waiting. The baby excretes irregularly many times in a day. Generally before 6 months the defecation remains irregular. But when the baby starts taking solid food,

Figure : 5.5 (Excretion)

cow's milk along with mother's milk, the time of defecation becomes regular. The mother gets to know baby's defecation time from the 1st month itself. The mother can make the baby sit on a pot for defecation a little early than his regular time. In this way the baby soon learns to use the pot on his own for defecation. Before the child is made to sit on a pot on his own, it should be ensured that -his muscles in the back are fully developed, he is able to balance himself in the sitting position and he is fearless to sit by himself.

Rest and sleep

For increasing working capacity and self activity of a child it is important to give some rest to his brain and neurological system. Sleep is a feature of health. If the baby is unable to sleep it must be understood that his body has some sort of problem or difficulty.

Time of sleep- a healthy baby sleeps for 22 hours in a 24 hour long day. He stays awake only if he is hungry or needs to defecate. These sleeping hours gradually decrease as the baby grows in age.

Figure : 5.6 (Bed Making)

Reasons for sleeplessness

1. Improper digestion of food
2. Wet clothing due to defecation
3. Heavy stomach due to excess of milk consumption
4. Hunger or thirst
5. More cold or heat stroke
6. Tight clothing
7. Noisy environment
8. If the baby is sick suffering from fever, stomach ache or cough-cold.

Important points for deep sleep

- Clean room with fresh air
- Proper digestion of food
- Mental peace
- Good health
- Proper bed

How to make baby's bed

A good sleep is important for a baby and a good bed is important for a good sleep. For this it is necessary that baby's bed is clean and soft. The shape of baby's bed should be correct. Bed should not be wet in any way. A pillow should support baby's head. The blanket covering the child should be soft and not heavy.

IMPORTANT POINTS

1. The immediate care of a newborn child is done by the doctor, nurse or a trained midwife.
2. After childbirth mother needs a lot of rest. Mother should take nutritious food along with avoiding laborious work.
3. Lot of caution and patience is required to take care of the newborn.
4. Breastfeeding by mother provides the nourishment to the baby. In some cases when mother cannot breastfeed, the baby has to depend on milk of cow, buffalo, goat or preserved bottle milk
5. Clean the bottle properly after formula is prepared.
6. Before taking the baby for bath check the warmth of water and keep important articles such as bath tub, boric lotion, oil, towel, clothes, powder etc, ready.
7. The baby needs some practice to defecate in a pot. Gradually he learns to do it by himself.
8. For a good sleep, baby's bed should be clean and soft.

EXERCISE

1. Choose the correct option

(i) Who takes care of a newborn?
(a) Doctor (b) Nurse
(c) Trained midwife (d) all of these

(ii) What is given to eat to a mother after normal delivery?
(a) Stodgy food (b) fried food
(c) Spicy food (d) kedgeree, porridge

(iii) The milk other than mother's milk which is given as nourishment to the baby is called –
(a) Colostrum (b) formula
(c) Pasteurized food (d) fat rich milk

(iv) Which bottle should be used keeping in mind its cleaning?
(a) small- mouth (b) wide mouth
(c) Round mouth (d) narrow mouth

(v) The temperature of water used for baby's bath should be
(a) Too hot (b) too cold
(c) Neither hot nor cold (d) none of these

2. Fill in the blanks

(i) ———— massage should be done before taking the baby for bath.

(ii) ———— should be washed immediately after milk is fed to the baby.

(iii) During gestation period, ———————— organs undergo considerable changes.

(iv) Mother should take rest for at least ——— days.

3. What precautions should be taken by the mother after childbirth?
4. Write about the food given to a new mother.
5. How should the bottle used for feeding milk to the baby be cleaned?
6. Explain the method of baby's bath.
7. Explain in detail how to take care of a newborn.

ANSWERS

1. (i) d (ii) d (iii) b (iv) c (v) c
2. (i) oil (ii) nipple (iii) pregnancy related (iv) 40-50

CHAPTER : 6
DEVELOPMENT FROM INFANCY TO CHILDHOOD - I

Development of infancy can be divided into 2 parts-

(i) Newborn infants (birth to 1st month)

(ii) Infancy (1st month to 5 years)

(i) Newborn infants or neonatal period (birth to 1st month) - Newborn baby in the early month of life is called a neonate.

(ii) Infancy (1st month to 5 years) - The stage from 1st month to 5 years of age is called infancy. In this, 1st month to 2nd year is infancy and from 2nd year to 5th year is early childhood.

Development of a child from birth to 1st year is described in fig 6.1.

Though an infant is physically immature and dependent and has limited cognitive ability but changes gradually begin to appear and child learns to walk, roam, speak etc. there are certain standards of different developmental changes during infancy but each child develops according to his own capacity and speed.

Developmental acts

1. Regulation of defecation
2. Learning solid food intake
3. Learning to walk
4. Gender differences
5. Learn to differentiate between right and wrong and learn to develop conscience
6. Getting ready to study

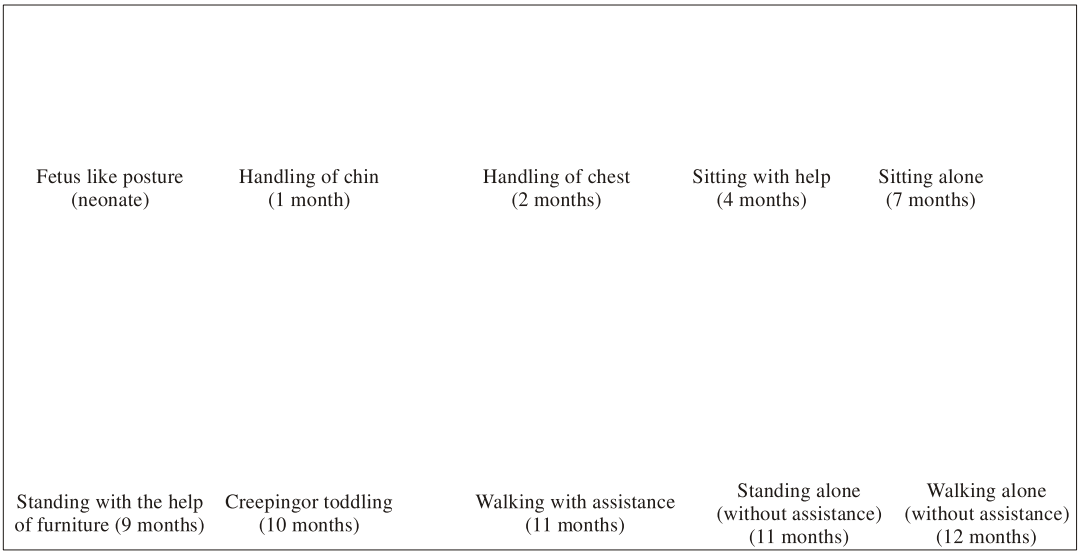


Figure : 6.1 Development of Child (infancy)

Different developmental stages in a child's life are explained in short in table 6.1

Table : 6.1 Developmental Stages

	Newborn to infancy	Infancy	Early- childhood
Physical development	Weight of the body doubles (12-15 pounds). The height of head is ¼ of the body's height. The nature of skin changes and new hair grow on scalp.	Upto 2 years of age, height increases by 2 inches and weight grows by 2-3 pounds. Activities like walking, running, cycling etc are learnt.	Compared to infancy growth in this stage is slow. During this stage, height grows by the rate of 3 inches per year. This stage is very important for learning skills. A child learns eating by himself, wearing clothes, buttoning, throwing a ball, etc.
Cognitive development	Child begins to develop sensation for things. Infant searches for moving stimuli. He learns to differentiate between colour brightness and intensity, reaction to noise stimulus, blinking an eye, etc.	Child begins natural activities like crying, throwing things etc. he begins to execute actions based on experiences. He learns to co-ordinate with situation and performs activities imitating elders such as combing, brushing, etc.	In later childhood, child expresses himself through actions, skills and talents. He learns to differentiate between people, thinking in reverse order, logical thinking, etc.
Language development	In the process of language development, baby learns to cry which involves the respiratory system.	Child begins to blabber, make some noises and uses some facial expressions.	In this advancing age, due to increased age and increasing learning abilities child develops his own vocabulary. With age, this vocabulary increases and with the completion of 5 years of age, he learns to frame complete sentences.
Social development	The child shares special attachment with the person on whom he is physically dependent and therefore he likes mother's touch. When the baby starts to recognize people he remains happy and content in their company and becomes unhappy, discontent when he is separated.	In this age, baby responds with a smile to a person whom he recognizes. He performs actions like hand-leg movements, shrieking etc. to attract attention. He differentiates between family and strangers by smiling at family members and remains silent with strargess	In this stage, parents, relatives, are main agents. As the child begins to interact with outsiders his world begins to grow. His dependency on parents decreases. This stage is also known as 'pre-gang' stage. Child begins to develop attachment towards peers/agemates

Emotional development	Emotional development and social development go hand in hand. Initially he has like and disliking emotions. Only three types of emotions are present at the time of birth- fear, anger, and love. The aggravation at the time of birth develops into emotions w	According to Bridges in this stage, first there is emergence of distress and happiness. In the 5th month, distress, anger, hatred, fear, jealousy etc emotions begins to surface. Happiness in the 20th month, after 2 years, with learning and maturity, the changes occur.	In this stage the emotional experiences increase. Anxiety, extreme fear, hatred are main emotions that are expressed in this stage. Activities like Playing, jumping, running makes children tired and brings about extreme emotional expressions.
Personality development	Neonate period is a sensitive age for personality development. The found ation of a child's personality on which the entire personality depends is laid in this stage. The child stays with the parents for the entire time and parent's relation has considerab be effect his personality of the gets favourable enviornment he grows into a suppotive being.	In this stage, ego of a child develops and the ego makes the core of a child's personality. The more rigid the ego factor is, more difficult it is to bring a change in personality. Modesty plays an important role in personality development.	Personality pattern is a result of interaction of heredity and environment. Initially family plays an important role in development of 'self'. As the child begins to go to school, this 'self' begins to grow according to social pattern. Children learn mobility. They einbibe fualities by unbibring self and modesty together make a balanced personality

FACTORS AFFECTING INFANCY

Physical factors

1. Negative parental environment
2. Difficult and complicated childbirth
3. Multiple births
4. Late maturity
5. Early maturity
6. Infant mortality rate

Psychological factors

1. Traditional belief about birth
2. Helplessness
3. Specialty of child
4. Developmental delay
5. Obstruction in development
6. Lack of motivation
7. New parental depression

IMPORTANT POINTS

1. Changes in weight and height of child take place under physical developmental changes.
2. Child begins to develop sensation and begins activities like crying, throwing things, reaction to noise stimulus as part of cognitive development.
3. Different social, language, emotional, and personality development is observed in a child.
4. Development of infancy can be divided into 2 parts-

(i) Newborn infants (birth to 1st month)

(ii) Infancy (1st month to 5 years)

5. Infancy (1st month to 5 years) - Stage from 1st

month to 5 years of age is called infancy. In this, 1st month to 2nd year is infancy and from 2nd year to 5th year in early childhood.

6. Physical and psychological factors affect development of infancy.

7. Neonate period is a sensitive age for personality development. The foundation of a child's personality on which the entire personality depends is laid in this stage.

EXERCISE

1. Choose the correct option:

(i) Infancy be divided Into how many parts can
(a) One (b) two
(c) Three (d) four

(ii) Which is the first activity in language development performed by an infant?
(a) Laughing (b) shrieking
(c) Speaking (d) shouting

(iii) Which of the following emotion is not present immediately after the time of birth?
(a) Fear (b) love
(c) Anger (d) jealousy

(iv) In which age does a child begin to blabber?
(a) newborn infancy (b) infancy
(c) early-childhood (d) later-childhood

(v) Which stage is known as 'pre-group' stage?
(a) newborn infancy (b) infancy
(c) later- childhood (d) early- childhood

2. Fill in the blanks

(i) ———————— development and social development go hand in hand.

(ii) Personality pattern is a result of interaction of ———————— and ————————.

(iii) Weight of the body ——— during newborn infancy.

(iv) With the completion of ————years of age he learns to frame complete sentences.

(v) In early-childhood 'self' begins to grow according to ———————— pattern.

ANSWERS

1. (i) b (ii) b (iii) d (iv) b (v) d
2. (i) emotional (ii) heredity, environment
(iii) doubles (iv) Five (v) social

CHAPTER : 7
DEVELOPMENT FROM INFANCY TO CHILDHOOD - II

Childhood is an extremely important step of all the steps involved in life span development. In this stage, growth and development in children takes place at a very rapid rate.

By the end of childhood stage height of a child is 57.5 inches and weight is 48 kg. There are paradigm changes in the face of child and slowly the baby face disappears. This age is also known as 'age of ugliness'. The child looks unattractive in this stage. By this age the child has full control over his muscles and nervous system. Purposive efforts are responsible for learning various skills. The child learns recognizable letters, colouring figures and clay sculpture. In addition to this, he learns some physical activities like running, jumping, crossing, leaping, etc. Sometimes because of parent's over-protectiveness child is unable to learn some skills and gradually falls behind his peers.

During childhood child has incredible strength, unlimited energy which he uses to learn various skills. But there are gender differences while learning certain skills for example girls learn skills involving finer muscles while boys learn large muscle involving skills. By the age of 6 years primacy of one hand gets established in a child. Though muscle development takes place in an order however many factors affect it.

Factors affecting physical development

1. Malnutrition
2. Physical weight and size
3. Diseases
4. Emotional condition (fear)
5. Lack of learning opportunities
6. Lack of encouragement
7. Modest qualities and feeble mind

Cognitive development

Cognition is the ability or process of acquiring knowledge and understanding through thought, experience, and the senses. Cognitive development determines development of attitude, adaptation skills, and management of fear originating from environmental changes, protection from distress.

In this age child understands things, incidents, information through his senses. He learns to reason, contemplate, analyze, memorize and wishes to know certain things in more detail and depth. The child in this stage is curious and investigative. This is the reason why child asks various types of questions to the parents, teachers, friends and companions. The child is gregarious and spends most of his time with friends and companions. He even shares his toys. He understands well the interconversion of milk into various

forms and that its volume and quantity remains the same. Similarly he understands micro concepts like weight, height, area, radius, diameter, depth, length etc.

Cognitive abilities in childhood

1. Memorizing ability
2. Reasoning ability
3. Questioning ability
4. Functional development
5. Contemplating ability
6. Generalizing ability
7. Reading-writing ability
8. Sensory exploration

Factors affecting cognitive development

1. Genetics
2. Senses
3. Maturity
4. Mental ability
5. Learning opportunities
6. Head injury
7. Physical health
8. Wisdom
9. Environment
10. Adaptation ability
11. Suitable facility for learning and training
12. Age differences

Intellectual development

Wisdom or intellect is a strength which gives an individual the ability to adjust with the changing situations. Intellect determines the individual's talent and individuals can be divided into sharp normal and feeble minded.

Intellectual development during childhood

1. Development of interest
2. Development of retention capacity
3. Curious tendency of a child develops
4. Observation capacity of a child develops and senses gain maturity.
5. Increase in reasoning ability with increase in curiosity.
6. Decision making ability increases.
7. Analyzing, memorizing, imagination and creativity develops.
8. Problem solving ability increases.

Factors affecting intellectual development

1. Physical health
2. Environment
3. Gender differences
4. Age differences
5. Sequence of child birth
6. School
7. Society
8. Mental maturity
9. Genetics
10. Sensory dysfunction
11. Brain defects
12. Education
13. Personality
14. Surroundings

Language development

Language is a popular medium of communication by which we can convey what we want to say. There is clarity in ideas. That is why language has an invaluable contribution in social, mental, cognitive, personality development. Therefore, language development in every child is important.

Stages of language development

Expressions before actual language

1. Crying
2. Blabbering
3. Facial expressions

Expressions of actual language

1. Pronunciation
2. Estimation ability
3. Vocabulary
4. Sentence formation

Pattern of language development

Language development pattern is similar to functional development and both go parallel. Language development is same in each child but the children who get motivation and training at the right time and practice learn the language early while the ones who do not get training, motivation and practice on right time learn it late.

Characteristics of child's language material

1. Self-centered language
2. Excessive questions
3. Repetition of words
4. Abstract language
5. Socialized language

Hardships of language (speech) development

Voice defects

1. Defects in pronunciation
2. Word meaning related defects
3. Defects in sentence formation

Voice disorder

1. Faulty pronunciation
2. Unclear pronunciation
3. Stammering
4. Lisping
5. Sharp obscure speech

Use of two languages

Bilingual in general means- 'using two languages'. This is not only concerned with speaking or writing but also for understanding what others speak.

Emotional development

Characteristics of children's emotions:

- Extreme and violent emotions
- Happening again and again
- Individual differences in emotional behaviour
- Easily observed and clearly visible
- Being momentous
- Associated with physical activities
- Changes in emotional strength
- Associated with concrete material and situations

Common emotions during childhood

1. Fear
2. Grief or sorrow
3. Curiosity
4. Shyness
5. Anxiety
6. Jealousy
7. Anger

Social development

Every child desires to talk, eat, roam and stay with his peers. He wishes that his friends like him and has respect in his peer-group. That is why many changes in child's behavior, dressing, speaking ways and lifestyle can be seen.

Specific patterns of social behavior during childhood

- Over-sensitivity
- Social acceptance
- Suggestion receptivity
- Responsibility
- Competition
- As a good player
- Social insight
- Social differentiation
- Biasness
- Anti-sexual expressions

Ethical development

Ethical behavior is the conduct according to the ethical code of a social group.

Learning pattern of ethical development

1. Trial and error
2. Role of customs, traditions and laws
3. Role of reward and punishment
4. Role of social consciousness
5. Knowing good and bad
6. Role of shame and guilt
7. Role of human consciousness

Importance of ethical development in child's life

1. Development of awareness
2. Development of decision making ability
3. Helpful in determination of conduct
4. Helpful in socialization
5. Development of attitude
6. Development in sense of security
7. Helpful in personality development
8. Helpful in character building

Factors affecting childhood

1. Diseases
2. Accidents
3. Physical incapability
4. Shapelessness
5. External appearance
6. Sexually inappropriate physical buildup
7. Obesity

IMPORTANT POINTS

1. Childhood is an extremely important step of all the steps involved in life span development. In this stage, growth and development in children takes place at a very rapid rate.
2. By the end of childhood stage height of a child is 57.5 inches and weight is 48 kg.
3. Malnutrition, physical weight and size, modest qualities and feeble mind, emotional condition, lack of learning opportunities, lack of encouragement, etc. are the factors affecting child's development.
4. Cognition is the ability or process of acquiring knowledge and understanding through thought, experience, and the senses.
5. A child learns to reason, contemplate, analyze, memorize by intellectual and mental development.
6. Memorizing ability, reasoning ability, questioning ability, contemplating ability, generalizing ability- are some of the cognitive abilities of childhood.
7. Wisdom or intellect is a strength which gives an individual the ability to adjust with the changing situations.
8. Hardships of speech development are- voice defects and voice disorders such as defects in

pronunciation, defects in sentence formation, word meaning related defects, faulty pronunciation, unclear pronunciation, stammering, lisping and sharp obscure speech

9. Bilingual in general means- 'using two languages'.

10. Stages of language development- crying, blabbering, facial expressions, pronunciation, analyzing power, vocabulary, sentence formation.

11. Ethical behavior is the conduct according to the ethical code of a social group.

EXERCISE

1. Choose the correct option-

(i) Which of the following does not affect physical development?

(a) Malnutrition (b) Nutrition

(c) Disease (d) Fear

(ii) Which of the following is a cognitive ability of childhood?

(a) Maturity (b) Senses

(c) Reasoning ability (d) Wisdom

(iii) How many languages are used in bilingualism?

(a) Two (b) One

(c) Three (d) Five

(iv) Which is a voice disorder?

(a) Defect in pronunciation

(b) Deaf and dumb

(c) Stammering

(d) Defect in sentence formation

(v) Which of the following is not a common emotion?

(a) Fear (b) Smiling

(c) Anger (d) Shyness

2. Fill in the blanks

(i) Language development is similar to ——— —— development

(ii) ———— behaviour is the conduct according to the ethical code of a social group

(iii) During ——— child becomes group loving.

(iv) Development of ———— takes place with increase of curiosity.

(v) Word meaning related defect is associated with ————.

3. Explain physical development during childhood.

4. Explain the factors affecting physical development during childhood.

5. Write the various cognitive abilities of childhood.

6. What are specific patterns of social behavior in childhood?

7. While explaining importance of ethical development in child's life write the factors affecting childhood.

ANSWERS

1. (i) b (ii) c (iii) a (iv) c (v) b

2. (i) social (ii) ethical (iii) childhood (iv) reasoning ability (v) voice defect

CHAPTER : 8

IMMUNIZATION (VACCINATION)

Before birth, a child lives in a definite environment in mother's womb. Therefore, during the gestational development only the internal environment affects the baby's health. But, after birth, he gets a new environment every moment of which affects his health continuously. Harmful elements present in the environment adversely affect the baby's health and as a result he suffers from different types of diseases. A survey shows that in India, 2/3rd of children lose their lives to Tetanus in the first month of their lives. Approximately 25% babies die because of Diarrhoea. Not only in India, but also in other developing countries 50-52 lakh children die due to Diarrhoea, Measles, Dehydration, Diphtheria, Polio and Tuberculosis.

Keeping in mind the mortality rate, it is important to pay attention to child health care. The foundation of a good health of a child is laid at the time of his birth. It is our responsibility to develop each child into a healthy and competent member of the family and society and a citizen of the country. Parents as well as guardians too should pay attention towards child health care. For this, after the baby's birth he should be vaccinated on time so that his body develops resistance capacity for different diseases.

Immunization

The best way to prevent a disease is immunization. Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease.

A vaccine typically contains an agent that resembles a disease-causing micro organism and is often made from weakened or killed forms of the microbe, its toxins or one of its surface proteins. Vaccine provides active acquired immunity to a particular disease. Some vaccines are orally administered while others are injected in the body.

Mainly immunization is done in two steps-

1. Primary immunization
2. Secondary immunization

In primary immunization for developing disease resistance, one or more injections are administered. These primary injections are for a definite time period. And so, as the time passes the disease resistance capacity reduces.

After the duration of primary immunization, secondary immunization starts. These are also called as 'boosters'. If the secondary immunization is not given then the disease is likely to appear.

Different vaccines for prevention of diseases

1. **Chicken pox vaccine-** Chicken Pox is a serious disease. At present, this is under control. The main solution for this disease is getting vaccinated in the first week after birth.

Chicken Pox vaccine was discovered by Edward Jenner (1978). His experiments have proved that cow pox provides protection against small pox. 'Cowpox' or 'Vaccnia' virus is administered through the vaccine which provides disease resistance capacity.

Pressure method is used for applying injections. Before the child is vaccinated for chicken pox, it should be ensured that he is not suffering from fever or is not weak and has no skin problem. The last patient of this disease was reported in 1975.

2. **B.C.G. Vaccine-** BCG Vaccine is administered for prevention from Tuberculosis. This vaccine is first given in the first month of birth and then at the age of 5 or 7. BCG was prepared by two scientists- Calmette and Guerin and hence, the name of the vaccine- Bacilli Calmette Guerin (B.C.G.)

Tuberculin Skin Test is performed for applying BCG vaccine. Only Tuberculin negatives are given the BCG vaccine.

This vaccine is injected in the upper part of the arm. After 6 weeks to 3 months of vaccination, a lump is formed. This stays for 2-3 months. If the lump stays for longer period, the person should consult the doctor.

3. **D.P.T. (Diphtheria, Whooping Cough and Tetanus) or Triple Antigen-** The vaccine components include Diphtheria and Tetanus toxoids and killed whole cells of the organism that cause Pertussis (WP). This vaccine should be administered to all the newborns in 3rd, 4th and 5th month. The booster vaccine is given in the 2nd year. With this, the child is secured against the disease attacking period.

After this vaccination, baby suffers from fever and there is soreness at the point of vaccination. Medication for fever and soreness should be taken from a doctor. Fever stays for 24 hours and if baby suffers for longer, a doctor should be consulted.

4. **Polio Vaccine**- There is no cure available for Polio and so administration of vaccine for polio becomes very important. Now-a-days, polio vaccine in the form of liquid drops or as sweet tablets is given. As it is given orally so the problem of fever or soreness does not appear.

Trivalent Oral Polio vaccine is available in our country. It is given when baby is 2-3 months old. 3 doses of the vaccine should be given at fixed duration of 4-8 weeks. Thereafter, dose is given once in a year to increase disease resistance. If oral polio vaccine is not available, then polio injections are given. If the child is suffering from diarrhoea or other viral disease then oral polio vaccine should not be given. It is best to give triple antigen and polio vaccine at the same time.

5. **Typhoid and Para-typhoid-** Typhoid is a prevalent disease in India. A combined vaccine of typhoid and Para-typhoid is available in the market. Sometimes Cholera vaccine is also included in it. When the child is of 2 years or a little less, this vaccine is given. This vaccine is generally given 2-3 times within a gap of 1-4 weeks. Secondary vaccine of this should be administered every year. The best time to give typhoid vaccine is the beginning of summers. The injection has Para-typhoid vaccine too. Fever and soreness are common side-effects.

6. **Cholera Vaccine-** Just like Typhoid vaccine, Cholera vaccine should be administered when the baby is 1-2 years of age. Summers are the suitable time for its application. This vaccine is generally given 2-3 times within a gap of 1-4 weeks. Vaccine should be administered every year to increase disease resistance.

IMPORTANT POINTS:

1. After the baby's birth he should be vaccinated on time so that his body develops resistance capacity for different diseases.
2. A person is made immune or resistant to an infectious disease, typically by the administration of a vaccine.
3. A baby should be vaccinated for chickenpox in the first week after birth.
4. BCG vaccine is given for protection against tuberculosis.
5. Triple antigen vaccine is given for diphtheria, whooping cough and tetanus.
6. Polio vaccine is orally administered.
7. Typhoid, Para-typhoid and cholera vaccine is given in combination.

EXERCISE

1. Choose the correct option-

(i) Chickenpox Vaccine is administered in

(a) First week after birth

(b) First month after birth

(c) First year after birth

(d) Five years after birth

(ii) BCG Vaccine is given for

(a) Tuberculosis (b) Measles

(c) Jaundice (d) Polio

(iii) Lump is formed after which vaccination

(a) Chickenpox (b) BCG

(c) Whooping Cough (d) Typhoid

(iv) Which of the following vaccine is given orally?

(a) Jaundice (b) Cholera

(c) Measles (d) Polio

(v) Which of the following vaccines can be given in combination?

(a) Chickenpox and Measles

(b) Polio and Typhoid

(c) Cholera and Typhoid

(d) Tuberculosis and Whooping cough

2. Fill in the blanks-

(i) The vaccine of Cholera is administered at the age of ————

(ii) The full form of O.P.V. is ————-

(iii) Triple Antigen Vaccine is ————, ———— and ————-

(iv) BCG Vaccine is for ———— disease.

(v) ———— discovered Chickenpox Vaccine.

3. Why is vaccination important?

4. Presently vaccines of which diseases are available?

5. What is immunization?

6. What are the steps of immunization?

7. For which disease is Chickenpox Vaccine given?

8. When and why are BCG, DPT and Polio vaccines administered?

9. Which vaccines are available in the market and explain their benefits.

ANSWERS

1. (i) a (ii) a (iii) b (iv) d (v) c

2. (i) 1-2 years (ii) Oral Polio Vaccine

(iii) Diphtheria, Whooping Cough and Tetanus

(iv) Tuberculosis (v) Edward Jenner

CHAPTER : 9

COMMON DISEASES IN CHILDREN

The initial time after baby's birth is tender. In this stage diseases attack children very quickly. Development of a sick child is hampered. Therefore, mother should be extremely cautious regarding child's health. Many a time it is seen that parents take the child to a doctor only when the ailment has aggravated. Best efforts should be made to restrict the disease in the initial stage itself. To achieve this, it is important to have knowledge about common diseases of children.

Early symptoms of diseases

The early symptoms of diseases commonly occurring in children are-

1. **Changes in behaviour-** The behaviour of a sick child is irritable, obstinate and he cries more than usual.
2. **Loss of appetite-** A sick child drinks less milk and loses appetite.
3. **Irregular bowel movements-** A sick child either has loose motions or constipation.
4. **Change in body temperature**- In case of fever or cough-cold body temperature changes from normal.
5. **Changes in activeness-** A sick child feels lethargic, tired and discomfort.
6. **Changes in skin-** Different diseases affect skin differently and cause different changes in skin. Skin appears dry, rough, red or grainy and sometimes yellowed.
7. **Changes in weight**- A sick child does not gain weight as he should according to his age.
8. **Changes in sleep-** Child sleeps less or he wakes up abnormally from sleep.
9. **Stays with mother-** Child doesn't leave mother's lap as he does usually.

Therefore, if one or more symptoms out of the above are noticed in the child by parents, they should consult a doctor. Until the parents take the child to a doctor, following measures can be taken by the parents-

1. In case of fever, note the temperature from time to time.
2. If the child is in pain touch his stomach, ears, eyes, legs, hands to know the reason of pain by his reaction.
3. If the child refuses to take feed do not force him.
4. Give boiled water to the child for drinking.
5. Take special care of child's personal and food hygiene.
6. In case of cough-cold and other disease do not depend on home remedies for long, visit a doctor.

The main digestion-related ailments in children are-

1. **Diarrhoea-** It is common in children. Diarrhoea is a condition in which faeces are discharged from the bowels frequently and in a liquid form.

Causes-

1. Irregular eating habits and time.
2. Excessive consumption of milk by child
3. Consumption of fat-rich milk by an infant other than mother's milk.
4. Giving cold and rancid milk to child
5. Consumption of stodgy and spicy food by breastfeeding mothers.
6. Beginning of dentition in the child
7. More of winter or summer season
8. Child suffering from fever, cough and cold.

Treatment

1. Stop giving milk to the child except mother's milk.
2. Do not give solid food to child
3. Maintain hygiene of milk bottle, nipple and other utensils coming in contact with baby's milk.
4. Rice starch or barley water can be given
5. To compensate for the loss of water and salts, feed a preparation of 1 liter water with a pinch of salt and a handful of sugar at regular intervals to the child.
6. Take care of baby's personal hygiene
7. Take the child to the doctor as soon as possible and get proper treatment.

2. **Constipation**- Constipation is a condition in which there is difficulty in emptying the bowels, usually associated with hardened faeces. Constipation is a common cause of painful defecation in children.

Causes

1. Less intake of liquids
2. Less intake of fiber- rich foods
3. Intestinal weakness
4. Providing nutrition to baby from milk other than mother's milk.

Treatment

1. Regularity in food intake and timing should be maintained.
2. Child should be encouraged to defecate at regular times.
3. Quantity of liquids should be increased in child's diet- add more water, fruit juices, vegetable soup in his diet.
4. If bowel movements remain irregular for 2 days enema should be given after consultation with a doctor.

3. **Loss of appetite-** Loss of appetite occurs when a child has a reduced desire to eat at set times.

Causes

1. Digestive disorder such as constipation, indigestion, etc.
2. Liver disease or intestinal infection.
3. The child is too tired

Treatment

Firstly find the reason behind loss of appetite. If the reason remains unknown visit a doctor for proper medicine.

4. **Milk vomiting (by infants)** - This is not a disease in general. Most babies vomit small amounts from time to time, and bring up some

milk when they burp. This is also known as possetting.

Causes-

1. Weak digestive system of baby
2. Entry of air in the stomach of the baby while drinking milk
3. Feeding protein and fat rich milk to baby.
4. Laying the baby on stomach side after feeding milk
5. Feeding excessive milk to baby

Treatment

1. Use the correct method while feeding milk to baby so that air does not enter stomach
2. After feeding milk hold the baby over shoulder, rub your hand on his back so that he belches.
3. Do not lay the baby on stomach side after feeding milk
5. **Worms in stomach -** There are three types of worms that can be present in stomach-

1. Round worms
2. Tape worms
3. Hook worms

1. **Round worm**- This worm is generally 8 inches in length and resides in intestines. Infection like indigestion, stomach ache and bloating occurs by consuming food or drink contaminated with the worm's eggs.
2. **Tape worm**- This worm is generally found only in children's stomach. These are small in size and white in color. Some symptoms of worm being present in child's stomach are itching in the anal passage, peeing in bed, loose motions, etc.
3. **Hook worm**- This is a small size worm found in intestines. They adhere to the walls of intestines and suck blood. Anaemia, weakness, hampered development, reduced digestion, loss of appetite etc symptoms indicate presence of worms.

Causes of entry of worms in body-

1. Eating, cooking or serving with dirty hands
2. Consuming contaminated food and water
3. Children playing in dirt
4. Eating of dirt by children
5. Not washing hands after defecation

Treatment

1. Maintaining hygiene of home and surroundings
2. Preventing children from eating dirt
3. Giving boiled water to children for drinking
4. Do not give excess sweets to children
5. Get the stools examined and taking medication on doctor's prescription.
6. **Cold-cough**- This is a very common ailment in children. Changing weather especially winter causes cold and cough. If the common cough and cold is neglected they take an ugly turn and gives rise to pneumonia and bronchitis. Therefore, this ailment should not be taken lightly and its treatment should be availed of at the earliest.

Causes

1. Excess of cold weather
2. Children playing in water in winters
3. Coming in contact with infected person
4. Sudden change in temperature.
5. Taking the child in open space immediately after bathing with hot water

Treatment

1. Prevent the patient from cold
2. Sponge and not bathing the patient prevents further aggravation of cold
3. Keeping away from cold things
4. Wearing sufficient woolen clothes in winter
5. Do not take the baby for bathing immediately after oil-massage.
6. Let the baby rest for ample time
7. Keep the clothes and towel of patient separate
8. If cough and cold persists for more than 3-4 days, consult a doctor.
7. **Goitre -**

   This is related to throat.

Symptoms

1. Swelling of glands on both sides of throat
2. Glands become large and inside of throat turn red.
3. Heaviness and pain in ears
4. Difficulty in eating- drinking
5. High fever and vomiting

Treatment

1. Consult a qualified therapist
2. Keep the neck covered with muffler
3. Give liquid or easily digestible food to patient
4. Gargle with salty or alum-rich boiling water

8. **Eye pain** - Paining of eyes of infants is a common problem which is a result of unclean eyes.

Causes

1. Unclean surroundings
2. Working in dim light
3. Entry of dirt, soil in eyes
4. Use of dirty hands or dirty clothes for cleaning eyes

Treatment

1. Prevent the eyes from sunlight and intense light
2. Clean eyes with boric lotion
3. Using clean hands, water, cloth for cleaning eyes
4. Preventing eyes from entry of dirt, soil, etc,
5. Consult an eye doctor

9. **Fever**- Fever is defined as having temperature above the normal range (98.4^{0}F) which can be felt by touching the body.

Causes

1. Physical weakness
2. Cough-cold
3. Malaria, typhoid etc
4. Growth of tonsils

Treatment

1. Let the child rest in a peaceful and comfortable environment
2. Give light and easily digestible food to eat
3. If fever is accompanied by cough and cold keep the child adequately covered
4. Consult a doctor
5. In case of high fever place cloth strips dipped in cold water on child's forehead

10. **Convulsions**- A convulsion is a medical condition where body muscles contract and relax rapidly and repeatedly, resulting in an uncontrolled shaking of the body. Teeth tighten, face becomes yellow, and child brings the hand in a fist and loses consciousness.

Causes

1. Damage to brain due to infection

2. Child suffering from meningitis
3. High fever- malaria, pneumonia etc
4. Epilepsy seizures
5. Congenital defect in brain
6. Gastroenteritis in stomach

Treatment

1. Lay the child on his back when convulsions begin
2. Loosen the clothing
3. Place a cloth seat between teeth so that tongue remains unhurt
4. If shaking goes on uncontrollably rub the patient's hand-feet and cover him with a blanket
5. Immediately take the patient to a doctor

IMPORTANT POINTS

1. The early symptoms of common diseases are- changes in behaviour, loss of appetite, irregular bowel movements, change in body temperature, activeness, skin, weight, sleep, etc.
2. Diarrhoea is a result of irregular eating habits and time, excessive consumption of milk or cold and rancid milk or fat-rich milk by an infant, beginning of dentition, etc.
3. Constipation is a condition in which there is difficulty in emptying the bowels, usually associated with hardened faeces.
4. Liver disease or intestinal infection leads to loss of appetite.
5. After feeding milk holding the baby over shoulder, rubbing hand on his back so that he belches reduces chances of milk vomiting.
6. Round worm, tape worm and hook worm is found in stomach.
7. Consuming contaminated food and water and eating with dirty hands causes entry of worms in body.
8. If cough-cold are not treated on time they may cause pneumonia and typhoid.
9. Goitre is a throat related disease.
10. Fever is defined as having a temperature above the normal range due to an increase in the body's temperature.
11. A convulsion is a medical condition in which body muscles contract and relax rapidly and repeatedly, resulting in an uncontrolled shaking of the body, teeth tighten, face becomes yellow.

EXERCISE

1. Choose the correct option-

(i) The body temperature rises because of

(a) Fever (b) Indigestion of food

(c) Not bathing (d) Un-cleanliness

(ii) When sick child

(a) Plays

(b) Feels tired and lethargic

(c) Feels happy

(d) Eats excess of food

(iii) When faeces are discharged from the bowels more than 4 times a day, it is a symptom of

(a) Constipation (b) Vomiting

(c) Diarrhoea (d) Worms in stomach

(iv) Which of the following is infectious-?

(a) Cough (b) Constipation

(c) Jaundice (d) Jaundice

(v) Which body part is affected by ———— ——?

(a) Ears (b) Throat

(c) Eyes (d) Mouth

2. Fill in the blanks-

(i) Temperature ———— above the normal body temperature in fever.

(ii) In ——— throat as well as glands swell.

(iii) Prolonged cough-cold may result in ——— and ————-

(iv) When ———— are present, worm adheres to the wall of intestines and suck blood.

(v) Weakening digestive system of a child is a symptom of ————-

3. Explain the disease caused by worms in stomach.

4. What are early symptoms of diseases?

5. What are the causes of diarrhoea?

6. Write the causes and treatment of constipation.

7. Write in short on loss of appetite and milk vomiting.

8. How many types of worms are found in the stomach of child?

9. Write the main causes and treatment of cough and cold.

10. Explain the causes and treatment for eye pain.

11. Explain in detail convulsions and fever.

12. Write the symptoms of goitre and eye pain.

13. Write about the treatment of constipation and diarrhoea.

14. Write the importance of vaccination.

ANSWERS

1. (i) a (ii) b (iii) c (iv) a (v) b

2. (i) 98.4^0F

(ii) Goitre (iii) Pneumonia and Bronchitis

(iv) Worms in stomach (v) Disease

CHAPTER : 10

ALTERNATIVE CHILD CARE

After birth of a baby the process of development and learning activities begin, they go on for the lifetime but changes according to the age. The period from 0-6 years of age is a crucial stage. The experiences gained in the childhood are important for developing positivity in life. For this, along with mother's care some other optional care is also required. There are many options available in our society and education system which are useful for the all-round development of a child. Following are the options-

Age: 0-2 years

1. **Home-based child care provider**- Appointing a nanny for taking care of child at home and for helping him in his daily activities.
2. **Creche day care center**- This is very useful for working women. Working women put their children aged 0-2 years in a crèche where they are taken care of.
3. **Mobile creche**- This crèche is run by non-governmental organizations and takes care of deprived and neglected children of labourers who move from one place to another for construction work. Easy to install tents are used where these children are taught.

Figure : 10.1 (Creche)

Age: 2-4 years

1. **Laboratory nursery school-** In these schools children up to the age of 2-1/2 years to 3-1/2 years are taught skills and basic knowledge while performing playful activities.
2. **Play school-** This education system is completely based on learning while playing because this is an effective and interesting medium of learning. Different types of games are organized for teaching children lessons in an interesting and entertaining manner. This encourages children to express their feelings, interests, opinions and this leads to an all-round development of the child. The activities and time set for learning is flexible and thus, it

removes fear of schools from a child's mind.

Age: 4-6 years

3. **Kindergarten-** Fredrick William Froebel (1782 A.D. – 1852 A.D.) gave the concept of Kindergarten in 1837. The Froebel gifts are play materials for young children designed by Friedrich Froebel for the all-round development of children. The Froebel gifts are-

   Gift I- Group of 6 colored balls

   Gift II- Set of wooden sphere, cylinder and cube.

   Gift III, IV, V, and VI - Block set of different shapes and size.

   Gift VII- Triangular and square shaped wooden set

   Gift VIII- Wooden straight lines and rounds of paper

   Gift IX- Set of seeds, stones, paper

   Gift X- Straw, sharp wood, wax etc.

   With the help of these gifts, Froebel explained the concept of solid, liquid, surface, lines etc. Clay baking, paper folding, paper cutting, beads threading, buttoning, drawing, etc. is included in this method.

4. **Montessori school**- Montessori (1870-1952 A.D.) emphasized the uses of senses in schooling of children. This type of learning is based on self-directed activity, for which different study material was given to the children. Montessori emphasized on practical activities, training of senses, and study of nature, language development, and intellectual learning.

5. **Pre-basic education**- Mahatma Gandhi (1869-1948) stressed on pre-basic education. He opined that education system should be child-centered. He emphasized on increasing creativity of children. The main purpose of this was development of habits, qualities, cleanliness (personal and of society), discipline, good language.

The government has started various programmes for optional care of children-

1. **Balwadi**- The Balwadi programme has been started for the benefit of children. The activities, games, nutrition of children from 3-6 years of age are taken care of.

2. **Anganwadi**- This programme is run by government as a part of ICDS for children of 0-6 years, mothers and teenagers. The education and nutrition related needs are taken care of.

IMPORTANT POINTS:

1. The period from 0-6 years of age is a crucial stage in child's life.
2. A nanny is appointed for taking care of child at home.
3. Working women put their children aged 0-2 years in a crèche where they are taken care of.
4. Laboratory nursery schools are for the development of children of age 2-4 years through various activities.
5. Options for children of 4-6 years are kindergarten, Montessori school, pre-basic education, Balwadi and anganwadi.
6. Mobile crèche is run by non-governmental organizations and takes care of deprived and neglected children of labourers who move from

one place to another for construction work.

EXERCISE :

1. Choose the correct option:

(i) The option for taking care of child at home is

(a) Crèche (b) Nursery school

(c) Nanny (d) Anganwadi

(ii) Which of the following is useful for the care of children of working women?

(i) Laboratory nursery school

(ii) Balwadi

(iii) Pre-basic education

(iv) Crèche

(iii) The facility especially taking care of labourer's children is

(i) Mobile crèche (ii) ICDS

(iii) Kindergarten (iv) play school

(iv) Who emphasized on the use of senses for studying?

(a) Tara Bai Modak (b) Maria Montessori

(c) Jawahar Lal Nehru (d) Mahatma Gandhi

(v) The founder of Kindergarten

(i) Frederick William Froebel

(ii) Maria Montessori

(iii) Mahatma Gandhi

(iv) John Rousseau

2. Fill in the blanks:

(i) Anganwadi programme is run by government as a part of ————————

(ii) ———————— is the age of child for studying in a laboratory nursery school.

(iii) Children aged ——— to ——— years are kept in a crèche.

(iv) ——————— is based on learning while playing.

(v) The concept of pre-education was given by ————————

3. Explain the difference between Balwadi and Anganwadi.

4. How is a child taught in a play school?

5. What is the utility of basic knowledge?

6. What is a Mobile Crèche?

7. What is the concept behind Montessori school?

8. Explain Kindergarten in detail.

9. What are the options available for the child care?

ANSWERS :

1. (i) c (ii) d (iii) a (iv) b (v) a

2. (i) ICDS (ii) 2-1/2 to 3-1/2 (iii) 0, 2
(iv) Play school (v) Mahatma Gandhi

UNIT : III
FAMILY NUTRITION

CHAPTER : 11
INTERRELATION BETWEEN FOOD AND HEALTH

As much as oxygen is important for survival likewise water and food are indispensable. Food is not only important for living but also for physical activities such as giving energy to body, for growth and development for regulation of various internal activities of the body. The intake of a balanced diet is important for good health. For understanding inter-relationship between food and health, knowledge of some definitions is required-

Food:

Food is any solid or liquid substance consumed, digested, to provide nutritional support for different kinds of physical and mental activities of the body.

In common language food is some thing which is consumed by us daily, which gives energy to body to perform daily activities and is helpful in body building. In addition to this, food regulates the activities of body and also protects it. Food provides nutrition to the body. Food is used in processes like catabolism and anabolism. Body building is not possible in the absence of food.

Nutrients:

Nutrient is a substance that provides nourishment essential for the maintenance of life and growth. The nutrients present in food are- protein, carbohydrate, fat, various vitamins, mineral salts, water and fibers. These nutrients together provide nutrition to the body and contribute towards in leading a healthy life.

Nutrition:

Nutrition is a science. It is the process of providing or obtaining different nutrients from the food through metabolic processes. Nutrients provide health, energy, protection and growth to the body.

Nutritional Status:

The nutritional status depends on the intake of food. It is the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity. There can be two situations of nutritional status—

1. Nutrition, 2. Malnutrition

Nutrition— Nutrition or good nutrition includes all the nutrients in the right proportion which leads to robust health of an individual.

Malnutrition— Malnutrition or improper nutrition includes either less excess quantity or imbalanced proportion of nutrients.

Therefore, malnutrition includes both Under-nutrition and Over-nutrition.

Under-nutrition— Under-nutrition is less availability of essential nutrients in the food which makes a person malnourished. Under-nutrition is a deficiency of calories or of one or more essential nutrients. Examples of Under-nutrition are— Anaemia, Marasmus, Goiter, etc.

Over- nutrition— Over-nutrition is a form of malnutrition in which the nutrients are oversupplied. The amount of nutrients exceed the amount required for normal growth, development, and metabolism. The examples of Over-nutrition are obesity, fluorosis, etc.

A balanced diet leads to a good nutrition level which results in good health. A balanced diet is a way of eating all the right nutrients that your body needs in order to be healthy.

Health:

Health is not only the state of being free from illness or injury. The meaning of health is different for different people. According to W.H.O., "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

Different aspects of health are like different parts. Therefore, if we wish to impart some meaning to our life we need to keep all the aspects of health in good shape. Good health includes physical, mental, social and spiritual health.

Physical health— Physical health shows the state of body which includes structure, development, functioning and care of the body.

Mental health— Mental health means our emotional and spiritual flexibility which enables us to bear situations of pain, disappointment and sadness.

Social health— Social health signifies ability of an individual to live in harmony in a community. A

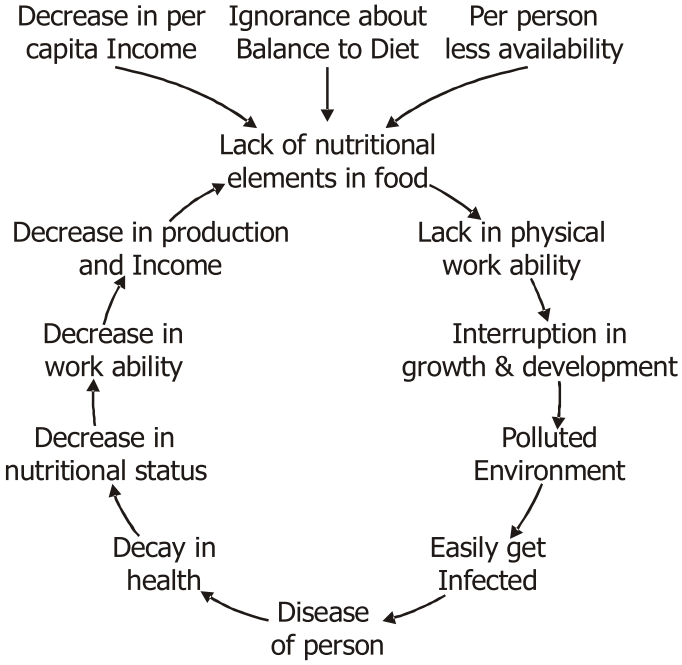


Figure : 11.1

socially healthy individual has qualities of altruism, tolerance and awareness. Such people are always happy and they maintain healthy relationships with others. This type of personality can adjust well in any social situation and this ability is helpful in uplifting his social status.

Spiritual health— Our good health is incomplete without our being spiritually healthy. The search for meaning and purpose of life makes us spiritual. Prayers and Yoga develop our inner capacity and strength. A spiritual person keeps his mind calm even in negative situations.

The inter-relationship between food and health:

A good and best health is possible by good food only. Good food means presence of all nutrients in proper proportion in it.

Basically it is the nutrients that make a body. For all the physical activities to go on smoothly nutrients are very essential. In the absence of nutrients nutritional status falls and a person gets afflicted with diseases.

Lack of nutrition leads to disrupted physical and mental development in children. Slow physical development or diseased body reduces working capacity and adversely affects productivity and livelihood and leads to deficiency of nutrients. (Fig 11.1)

IMPORTANT POINTS:

1. As much as oxygen is important for survival likewise water and food are indispensable for living.
2. Food is any solid or liquid substance consumed, digested, assimilated to provide nutritional support.
3. Nutrient is a substance that provides nourishment essential for the maintenance of life and for growth.
4. Nutritional status is the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity. There can be two situations of nutritional status— Nutrition and Malnutrition.
5. A good health includes 4 aspects: physical, mental, social and spiritual health.
6. A healthy person is one whose weight and height is in accordance with his age and gender, he is a sociable person, a firm believer and possesses a well-built body, sharp mind, attractive personality.
7. There is an inter-relationship between food and health. If a person consumes nutrient-rich food, his nutritional status and health always remain good.

EXERCISE:

1. Define the following—

   Food, Nutrients, Nutrition, Nutritional status, Health
2. Explain the 4 aspects of health.
3. Explain the types of nutritional status.
4. Explain the effect of malnutrition on health.
5. Write the inter-relationship between food and health.

CHAPTER : 12

FUNCTIONS OF FOOD

Functions of food:

Air, water and food are 3 basic requirements for survival. Food, after water and air, is an essential element for a human being without which it is not possible to remain healthy and be alive for many days. A balanced diet with adequate proportion of carbohydrates, fats, protein, vitamin and mineral salts is essential for good health. Water has no nutrients yet in itself is included as a nutrient. This is because water is essential for various activities of body for life, for mainly proper balance and regulation of body temperature. Water is essential for ingestion, digestion, absorption, transportation and excretion of food. Food includes two types of food items: vegetarian food items and non-vegetarian food items. Milk, milk products, food items grown in farms such as cereals, lentils, oilseeds, green vegetables, stem-roots, fruits etc are vegetarian food items. People consuming vegetarian food items are called vegetarians. Eggs, meat, fish etc are non-vegetarian food items and people consuming these are called non-vegetarians.

Both the types of food items affect the physical growth and development. This effect is due to the presence of nutrients in the food items. Actually the nutrients present in the food are responsible for various activities of the body.

The nutrients present in food perform different functions. Various nutrients are — carbohydrate, fat, protein, vitamins, mineral salts and water —

1. **Carbohydrate—** Carbohydrates is the main source of energy. Fibers are also present in it in adequate quantity. These fibers help in digestive process by sending the food by synchronized contraction of stomach into small intestines where it gets digested easily. It helps in easy excretion and prevents constipation. All cereals like rice, wheat, maize, barley, millets, etc are main source of carbohydrates.
2. **Protein—** Protein is essential for body's growth, muscle formation, repair of damaged fibers, hormone formation and blood clotting. Cells are made of proteins. Therefore, protein is essential for cell formation. Hence known as 'formative element'.
3. **Fat—** Fat is a concentrated source of energy. It provides energy and calories to the body. Fat is stored in the fatty tissues under the skin and when needed (like on fasting day or while travelling or some other day when food is not available to the body) fat breaks down to provide energy to the body. One gram fat gives **9 kilo calories**. Ghee, oil, groundnuts, vegetable ghee, mustard oil, other oilseeds

contain fat in adequate quantities.

4. **Vitamins—** Vitamin is an organic compound which is called an essential nutrient element. It is required in small quantity but is important for body's health. Vitamins are essential for metabolism and complex chemical reactions. They provide protection to body and give strength to fight against diseases. They work as a catalyst in the body and help in various physical activities. Therefore, consumption of vitamin-rich food is very important.

5. **Mineral salts—** Vitamins mineral salts are also important for the body. They perform two important functions—

(a) Formative functions

(b) Regulatory functions

Minerals are important for growth and development of the body as well as for formative works. Various activities of the body are regulated by mineral salts. Some mineral salts are required in large quantities while others in small quantities. Minerals required in small quantities are called 'trace elements'. Though these are required in very small quantities yet these elements are very important for the body.

6. **Water—** After air, water is the fundamental requirement for a human being. Water works as a solvent and is important for various activities of body. 65% of our body is made up of water. Generally water is present in all food items.

Food elements and their proportion— Many nutritive elements are present in food. A person while including food elements in his daily diet should take care that it has carbohydrates, fat, and protein in adequate quantities. Carbohydrate should be 60-70%, fat- 20-30%, protein- 10-15%. Food is essential for survival. It is essential for nutrition of body, growth-development, control-regulation etc. and also for social and psychological functions.

Food helps in following functions—

1. Physical work
2. Psychological functions
3. Social and cultural functions

1. **Physical work—** The food that we eat becomes a part of our body. The main functions of food are physical growth & development, repair of damaged nerves, control and regulation of various activities, etc.

The role of food in various activities is as follows:

(i) Food provides energy to the body— Energy is required for various physical activities- walking, sitting, running, working, etc. even when we sleep our body organs work on their own performing breathing, digesting, and absorption activities. Energy is required for

Figure : 12.1 (For Energy)

performing all these activities. And we take this energy from the food we eat. Fat and carbohydrates are the main sources of energy. They provide energy and so are called energy-

giving foods. If needed, protein can also provide energy. 1 gram carbohydrate and protein gives 4 kilocalories and 1 gram fat gives 9 kilocalories. We should take energy from carbohydrates and fat because protein is essentially a formative nutrient.

(ii) **Food helps in physical growth and development—** Body is a developing biological unit which is made up of small cells; cell is the smallest unit of body. Our body is made of numerous cells. When foetus is in mother's womb cells develop into tissues and body grows and develops. The process of body-building is active in infancy, childhood and adolescence. This is the reason why a child of 2.5kg-3.5 kg and 40-50 cm in length at the time of birth gains a weight of 50-75 kg and 5-6 feet in youth.

Figure : 12.2 (For Growth)

When in mother's womb, child receives nutrition from mother and after birth; he has to take food rich in nutritive elements by himself. The growth and development in children depends on balanced diet. In childhood, growth occurs at a rapid pace and so during this time nutritious and balanced diet is very essential. The food consumed during early years of life is essential to maintain health of the body. In the old age, formative nutritive elements are required in greater quantities because in this age cells and fibers are formed less but are damaged more. So energy providing foods are required less and protein, vitamins and mineral salt-rich food is required more. Fig. 12.2

(iii) **Protection to the body against diseases and control of various body processes—**Food provides protective power against diseases, keeps up the health and controls as well as regulates various functions of body. For example— control of body temperature, blood balance, acid-base balance, excretion, activation of enzymes, etc. the protective and regulatory functions carried out by various vitamins, mineral salts and water present in the food. Each of the elements is responsible for its own unique function in the body. If there is deficiency or over-sufficiency of any element disorder develops in the management of various processes and body gets afflicted with diseases. This in turn will adversely affect body's growth and development. Body gets strength against diseases from these nutritive elements and therefore, these elements are also known as 'protective elements'. Green leafy vegetables, other vegetables, fruits, milk, eggs, meat and fish are the main sources of these vitamins and mineral-salts. In addition to these sources, these nutritive elements are also found in lentils and cereals.

2. **Psychological functions—** Food not only fulfills our physical requirements but also gives psychological satisfaction. For the fulfillment of our daily requirements, only presence of nutritive elements in our body is not enough but also the quantity of food, choice of food, properly cooked food and a good environment while

eating is also essential. In this manner not only our hunger is satisfied but we feel contented too. We must have experienced that the food we eat daily also gives us mental satisfaction. A person belonging to north India who likes to eat wheat would not like eating rice or Idli-dosa for long. New food items are good for a change but then we like to eat food that we normally eat. Food also gives us relief from daily grid and tension. The delight of home-made food is incomparable to the food from hotel or restaurant. This is so because there is love, sentiment, affection attached. It is prepared keeping in mind the choice of every individual of the famly.

Food helps in following psychological functions:

(i) **Expression of emotions through food—** Emotions are expressed through food. A happy person eats more while an unhappy one eats less. Some people eat more to relieve their stress while some eat less.

(ii) **As a form of security**—Food is a symbol of security. If a person is away from home or is travelling if he gets familiar food he experiences a sense of security. Food fed by mother gives more protection than the case when it is provided by someone else. A child doesn't feel happy when someone other than his mother feeds him.

(iii) **Use of food as power**— History has been witness to many examples where food was used as form of power. Keeping enemies away from food was the easiest way to win a battle. A person is kept hungry to make him confess something. 'Hunger strike' is a common way of protest against any institution. Even in families food is used as a means of reward and punishment. Children are rewarded with special dishes on commendable work while they are refrained from eating their favourite food such as ice-cream as a form of punishment.

3. **Social works and cultural importance—** Food helps in making and strengthening social relations. That is why food is served on various social functions. Food is a symbol of friendship. Snacks, *prasad*, feast are planned for social functions. Gatherings are organized to celebrate birthday, wedding, anniversary, tonsure, promotion in job, childbirth where feast and other elegant dishes are served. Special festivals are celebrated with good food.

(i) **Food is a symbol of financial status—** Choice of an individual's food depends on his financial status. A middle-class man arranges his food with the seasonal fruits and vegetables and other normal food items while a rich man can even arrange un-seasonal food items to his food. He can add expensive nuts, fruits and vegetables in his diet. In this way food indicates a person's financial status. The food served to a guest is a symbol of our prestige and prosperity. Consuming good food and the resultant obesity from it is considered a symbol of prosperity in some communites.

(ii) **Food is a symbol of friendship and hospitality—** New food items are served to friends to strengthen the bond of friendship. Food is served as a symbol of hospitality — tea, coffee, drinks are served to guests. In India, guests are treated equivalent to Gods and as kind hospitality good food is served.

Food can solve many big problems because it

is said 'the way to heart is through the stomach'. Thus, many personal and social works can be easily carried out through food.

While making arrangements for food choice of others should be kept in mind. Arrangements of snacks, food, drinks are done for establishing mutual comfort and amicability. Food served on special occasions should be palatable, satisfying and should be healthy and nutritious.

Food is also a symbol of culture. For example — *makki ki roti* and *sarson ka saag* is famous in Punjab, *dal-bati churma* in Rajasthan, rice-sambhar in south India, fish-rice in Bihar and *vada-paav* in Mumbai. This way some food items display the culture of a society or a region. We all like to eat food according to our own traditions and culture.

Food is just not an article for eating but it is also a medium for expression of someone's happiness and security and a medium of displaying emotions, traditions and culture. Food relieves stress and strengthens social relations. A psychological and emotional response towards a certain type of food has no scientific reason and thus, it is difficult to change that response.

IMPORTANT POINTS:

1. Air, water and food are 3 basic requirements for survival.
2. Water included as a nutrient because it is essential for various activities of the body, for mainly proper balance and regulation of body temperature.
3. All cereals like rice, wheat, maize, barley, millets, etc are main sources of carbohydrates.
4. One gram fat gives 9 kilocalories. Ghee, oil, groundnuts, vegetable ghee, mustard oil, other oilseeds contain fat in adequate quantities.
5. Protein is essential for cell formation and so, protein is known as 'formative element'.
6. Vitamins give body the strength to fight against diseases and thus consumption of vitamin-rich food is very important.
7. 65% of our body is made of water.
8. Carbohydrate should be 60-70% of our food while fat should be 20-30% and protein- 10-15%.
9. Food as far as possible should be prepared keeping in mind every choice of every member of the fovily.
10. Food is just not a thing for eating but is a medium of displaying emotions, traditions and culture.

EXERCISE:

1. Choose the correct option—

(i) The main source of energy is:-

(a) Carbohydrates

(b) Protein

(c) Vitamin

(d) Water

(ii) Which of the following is not a physical function of food—

(a) Energy providing

(b) Growth and development

(c) Providing peace

(d) Protective and regulatory functions

(iii) Which of the following is formative element?

(a) Carbohydrates (b) Protein

(c) Water (d) Fat

(iv) What % of water is present in human body?

(a) 65% (b) 67%

(c) 63% (d) 64%

2. Fill in the blanks—

(i) ———— is a medium of expressing emotions.

(ii) Body requires more formative elements in ————————

(iii) ———————— repairs damages to the body.

(iv) Vitamin is a ———— compound.

(v) ———————— and ———————— is found in abundance in green leafy vegetables, fruits, eggs and meat.

3. Why is food important for the body?

4. What are the functions of food? Describe briefly.

5. Throw light on functions of various food elements.

6. Write the social functions and cultural importance of food.

ANSWERS:

1. (i) a (ii) c (iii) b (iv) a

2. (i) food, (ii) old age (iii) protein, (iv) Organic (v) vitamin and mineral salts

CHAPTER : 13

NUTRIENTS — MACRONUTRIENTS

There are many nutrients present in the food. These nutrients in food are important to perform complex chemical processes of the body. All nutrients— carbohydrates, protein, fat, mineral salts, vitamin, fibers and water should be present in adequate quantities. Nutrients can be divided into 2 types:—

1. **Macro nutrients—** In this category carbohydrate and fat provide energy and protein helps in growth and development. Fibers help in digestion of food and water is essential for all activities. The nutrients of this category are required in large quantities.
2. **Micro nutrients—** In this category different vitamins which participate in complex chemical processes and mineral salts perform formative functions. These nutrients are required in less quantity.

Carbohydrates— Carbohydrates is a major part of our food. A person takes 55-65% energy from carbohydrates present in the food. Carbohydrates are cheap and simple source of energy. The main source of carbohydrates is vegetation. Green leaves using carbon dioxide and water, in the presence of chlorophyll pigment and sunlight, form carbohydrates ($C_6H_{12}O_6$). These carbohydrates are stored in the form of sugar, starch, cellulose and hemi-cellulose.

Chlorophyll + $6CO_2$ + $6H_2O$ + sunlight $\rightarrow$ photosynthesis $\rightarrow$ $C_6H_{12}O_6$ + $6O_2$

Chemical Formation — The basic constituting unit of carbohydrate is sugar in which carbon, hydrogen and oxygen elements are present. The ratio of hydrogen and oxygen is same as water. That is why it is named carbohydrate. Its chemical formula is $C_n(H_2O)_n$

Classification— Carbohydrates are classified on the basis of molecular structure—

Table : 13.1

Carbohydrates		
Monosaccharide	**Disaccharides**	**polysaccharides**
Glucose	Sucrose	Starch
Fructose	Lactose	Glycogen
Galactose	Maltose	Dextrin
		Cellulose
		Hemi-cellulose
		Pectin

(1) Monosaccharides— This simple type of carbohydrate is made up of two words— Mono + saccharide or one sugar. After digestion all forms of carbohydrate changes into simple sugar form. There are 6 carbons. That is why they are called as hexoses. The three main hexoses are—

(i) Glucose— Glucose is also called as Dextrose,

'blood sugar' or 'grape sugar'. Most of the carbohydrates in the body get converted into glucose and give energy.

(ii) **Fructose—** Fructose is also called as 'fruit sugar'. This is the sweetest of all sugars. It gets absorbed by the body very fast.

(iii) **Galactose—** This is not present individually but in combination with other food items. Milk sugar lactose is made up of one molecule glucose and one molecule galactose. It is not found in any vegetation.

2. Disaccharides— When two molecules of monosaccharide combine by a condensation process then formation of disaccharides take place.

(i) **Sucrose—** Sucrose is formed using sugarcane juice or beetroot.

Sucrose → glucose+fructose (sucrase enzyme)

(ii) **Maltose—** It is formed from two molecules of glucose. It is also known as malt sugar and is formed during germination of grains.

Maltose → glucose + glucose (maltase enzyme)

(iii) **Lactose—** It is also known as milk sugar. It is less sweet and is less soluble in water compared to other sugars.

Lactose → glucose + galactose (lactase enzyme)

3. Polysaccharides— These are complex carbohydrates. That is why these are easily stored in plants and trees. From the point of nutrition starch, dextrin, cellulose, glycogen, pectin, hemicelluloses are main sugars.

(i) **Starch—** Starch is mainly made of amylase and amylopectin. Plants and trees are the main sources of starch. Starch is present in cereals like wheat, rice, millet, stem and root vegetables, dried seeds, peas; apple etc. in uncooked fruits carbohydrate is present in the form of starch which on cooking it changes into sweet sugar (mono and disaccharides).

(ii) **Glycogen—** Glycogen is also called as 'animal starch'. It is present in liver and muscles of living humans and animals. It changes into glucose when need arises.

(iii) **Dextrin—** It is obtained by partial hydrolysis of starch. It is less complex than starch. It is present in corn sugar, corn syrup, and honey.

Starch → dextrin → maltose → glucose

(iv) **Cellulose—**It is made up of many glucose units. It is present in cell walls. It is not digested in the human body. But it is helpful in maintaining contraction and relaxation rate and functioning of intestines and muscles. It is present in adequate quantities in bran flour, whole grains, salad, etc.

(v) **Hemi-cellulose—** This is not digested in the human body. But it is important for the health of the intestines. It is found sufficiently in shelled pulses and grains.

(vi) **Pectin—** It is present in the peels of ripened fruits and some root vegetables. This too like cellulose and hemi-cellulose does not get digested in human body. It is important for making jam and jelly in fruit industry.

Functions—

1. Providing energy— The main function of carbohydrate is providing energy. 1gram carbohydrates give 4.2 kilocalories of energy. It is the main source of energy. The excess of carbohydrates is stored as glycogen in liver and muscles which gets converted into glucose

when need arises.

2. **Protein saving—**The main function of protein is growth and development of body. But in the absence of carbohydrate and fat protein starts breaking to provide energy. As a result, formative functions of protein are affected.
3. **Synthesis of vitamin B group—** Lactose is essential for synthesis of vitamin B. The bacteria present in small intestines are auxiliary in the synthesis of vitamin B.
4. **In maintaining health of digestive system—** Cellulose, hemi-cellulose, pectin, etc are not digested by human body but these are important for cleaning the stomach and maintaining the contraction and relaxation rate of intestines which prevents constipation.
5. **Absorption of calcium—** Lactose present in milk is less soluble than other sugars and it gets converted into lactic acid in the presence of bacteria and increases the acidic medium important for absorption of calcium.
6. **Other functions—** Glucose helps in completion of oxygenation of fats and increase the use of fats. Consumption of fibrous and complex carbohydrates reduces blood cholesterol and glucose which in turn reduces chances of heart diseases and diabetes. Carbohydrates help in keeping liver and vascular system healthy and in removal of harmful substances.

Sources— All types of cereals— wheat, rice, millets, maize, some lentils, sugar, jaggery, honey; root vegetables such as potatoes, sweet potato, beetroot, taro root; dry fruits such as— raisins, figs, dates, apples, cottage cheese, etc. are main sources of carbohydrates.

Effects of deficiency— 55-66% of total energy required should be taken from carbohydrates present in the daily diet. In the absence of carbohydrate and fat, protein breaks up to provide energy. As a result the main function of protein becomes secondary. Thus, the growth and development is disrupted. Other effects are—

1. Loss of weight.
2. Lethargy, irritation and nervous behaviour.
3. Less physical activities
4. Occurrence of digestive system related disorders.

Effects of excess of carbohydrates— Excess of carbohydrates in food gets stored as fat in the body and leads to obesity. The working capacity reduces. Obesity leads to diseases such as heart disease, diabetes, ketosis, etc.

Importance of fibers in food—

1. The fibers (cellulose, hemi-cellulose, pectin, and lignin) present in food substances are not easily digested. Therefore, they do not provide energy and reduces the energy value of food. Low energy but fiber rich food substance only give satisfaction of eating.
2. Fibers present in food increase the rate of contraction and relaxation of intestines and solve the problem of constipation.
3. Fibers in the food get combined with other nutrients and reduce the absorption of those nutrients in the intestines, as a result they help in maintaining low levels of blood glucose and cholesterol. That is why fiber rich food is especially important for diabetic and people with heart diseases. These fibers combine with cholesterol from the gall bladder and reduce

the rate of absorption of food. They synthesize vitamins in the intestines. The decomposition products of fats by bacteria in intestines keep the intestines and mucous membrane healthy and prevent intestinal cancer.

Sources— Fresh fruits, vegetables, green leafy vegetables, whole grains and lentils are good sources of fibers.

Fats — Fats are a concentrated source of energy. Fat is an organic compound which is insoluble in water but soluble in organic solvents such as chloroform, benzene, ether, etc. These are smooth to touch.

Chemical Formation — Carbon, hydrogen and oxygen are main elements of fats. The quantity of oxygen is less than that of carbon and hydrogen. Fats are divided into 3 parts.

Table : 13.2 Classification

Fats		
simple	**complex**	**derivative**
Fat and oil	Sulpho-lipids	Fatty acid
wax	Glyco-lipids	Saturated
	Phospholipids	Unsaturated
	Lipoprotein	Glycerol
		Sterol
		Cholesterol

1. **Simple fat—** It is formed by combination of glycerol and fatty acids.

   Glycerol + fatty acid = simple fat

   1 molecule 3 molecules

(i) **Neutral fat—** Fat and oil are included in this category. Fats are the substances that condense at 20^0 Celsius to become solids while those which are in liquid state at this temperature are called oil. Fats and oils are made up of glycerol and fatty acids.

Glycerol + fatty acid = fat and oil

(ii) **Wax—** Wax is a lipid made up of a chain of alkanes or esters from alcohols and fatty acids.

2. **Compound fat—** when some organic compounds combine with fatty acids and glycerol compound fats are formed.

   Fat + ———— = compound fat

   (Glycerol + fatty acid) + (organic or inorganic substance)

(i) Fat + carbohydrates + sulphuric acid = sulpholipid

(ii) Fatty acid + glycerol+ carbohydrates = glycolipid

(iii) Fatty acid + glycerol + phosphoric acid + nitrogen bases = phospholipids

(iv) Fat + protein = lipoprotein

3. **Derivative fat —** The new products formed by the hydrolysis of simple and compound fat are called derivative fat.

(i) **Fatty acid—** Fatty acids are obtained by hydrolysis of fats. Fatty acids are differentiated on the basis of difference in composition occurring at different positions of carbon molecules and hydrogen molecules.

(a) **Saturated fatty acid—** A saturated fat is a type of fat, in which the fatty acids have single bonds. For example, butyric acid, palmitic acid, etc.

(b) **Unsaturated fatty acid—**An unsaturated fat is a fat or fatty acid in which there is at least one double bond within the fatty acid chain.

Thus, carbon and hydrogen are bonded by double bonds. Examples: folic acid, linoleic acid, etc.

(ii) Glycerol— Glycerol obtained by hydrolysis of fat performs the function of energy production.

(iii) Sterol— Chemically sterol is not related to fat but fatty acid and alcohol are present in it. These are the organic compounds which are made up of mixed cyclic conformations.

Sterols can be divided into following categories on the basis of source—

(a) Cholesterol— It is found in the animal world. It is found in blood, liver, adrenal glands, pituitary gland, brain and peripheral nerves of humans and animals. Cholesterol is present in yellow part of eggs, butter, ghee, cottage cheese, meat, liver, etc.

(b) Ergosterol— This fat is mainly found in yeast. It is also present in the human body under the skin where it gets converted into vitamin D in the presence of ultraviolet rays of the sun.

Functions—

1. **Providing energy—** Fat is a condensed form of energy. 1 gram fat gives 9 kilocalories energy. Therefore fat provides twice the energy than carbohydrates and protein. Because of high density and low solubility fat remains stored in fatty tissues and they get oxygenated to provide energy whenever need arises.
2. **Providing protection to soft organs of the body—** Fat remains stored in fatty tissues under the skin and acts as a thick layer. There is a double layer of fat on all soft organs of the body such as heart, liver, lungs, kidneys, and pancreas. This double layer acts as a protective layer.
3. **Controlling body temperature—** The fat layer under our skin acts as a thermal barrier. Thus, fat is helpful in controlling and regulating body temperature.
4. **As a source of soluble vitamin—** Fat is the best source of obtaining fat soluble vitamins 'A', 'D', 'E', 'K'. These vitamins are easily absorbed in the presence of fats.
5. **Procurement of essential fatty acids—** Some essential fatty acids are not formed in the body but they are important for the health of body and protection of skin and fat-rich food makes it possible.

Other functions— Fat is digested slowly. The stomach does not get rid of it and one does not feel hungry. In fact, fat reduces the secretion of gastric juice in stomach. Fat helps in keeping skin smooth and healthy. It acts as a lubricant of alimentary canal and it helps in keeping the passage of stomach and intestines smooth. In addition to this, it helps in production of other important products.

Source— fats and oils are obtained from both animal and plant sources.

Plant source— cereals, lentils, groundnuts, sesame, coconut, mustard, dry fruits such as cashew, almonds and vegetable oil obtained from them.

Animal source— ghee, butter, cream, milk, milk products, fish oil, animal fat, etc.

Effects of deficiency—

Following are the effects of deficiency of fat in food—

1. Decrease in availability of energy to the body
2. Normal growth stops
3. Dryness, roughness, dullness of skin
4. Phrynoderma
5. Decrease in working capacity of cells
6. Lack of essential fatty acids such as linoleic acid, linolenic acid, arachidonic acid and fat soluble vitamins A, D, E, K.

Effects of excess of fat—

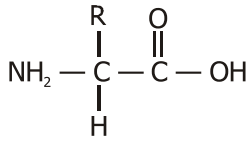
1. **Obesity—** Obesity is a condition where a person has accumulated more body fat which increase weight of the body.
2. **Diabetes—** Excess consumption of fat and carbohydrates leads to excess formation of glucose. Glucose can be stored to a limited extent in the blood. Diabetes is a disorder of the metabolism causing excessive thirst and the production of large quantity of urine.
3. **Heart-related diseases—** Excess of fat in blood causes an increase in cholesterol. Excess of cholesterol gets accumulated in the inner walls of arteries. It is called Atherosclerosis. As a result, blood pressure increases and this has a direct effect on the heart which increases the chances of heart attacks.

Protein— Protein is essential for survival, therefore, it is the most important element of all. That is why protein is called as 'body-building unit'. Protein is derived from Greek word *'proteios'*, meaning "primary", "in the lead", or "standing in front '. A Dutch chemist Gerrit Mulder is credited with coining the term "protein" in 1838. The 1/5th part of human body's weight or 20% of it is made up of protein.

Chemical Formaton — protein is an organic compound. Carbon, hydrogen, oxygen, nitrogen elements are present in it. The main part of protein, about 16%, is made up of nitrogen. Amino acid is the smallest unit of protein. Many amino acids together make a protein, so an amino acid is called as base unit.

Amino group (-NH_2) is basic in nature and provides the basic character to the protein. Carboxyl group (-COOH) is acidic in nature and provides acidic character to the protein. Therefore, presence of both these groups makes amino acid neutral in nature.

The chemical formula of amino acid is—



Amino acid

Emil Fischer and Hoff Mischer in 1920 reported the linking of amino acids through peptide bonds.

The quality of protein depends on types of amino acids present, their quantity and their way of linking. We know about 22 types of amino acids present in our body and food. Out of these, 10 amino acids are very important for the growth and development of our body. These are known as essential amino acids.

Essential and non-essential amino acids— Essential amino acids are drawn from the food that we eat because in the absence of essential amino acids growth and development of our body is disrupted. Following are the essential amino acids—

1. Histidine
2. Leucine
3. Isoleucine
4. Lysine
5. Arginine
6. Methionine

7. Threonine
8. Phenyl alanine
9. Valine
10. Tryptophan

Non-essential amino acids are formed in the body itself in the presence of nitrogen. Following are the major non-essential amino acids—

1. Alanine
2. Hydroxyproline
3. Proline
4. Aspartic acid

Classification of protein— Protein is classified as given in the table— 13.3

Table : 13.3

Protein		
On the basis of quality	**On the basis of source**	**On the basis of chemical structure**
Complete	From Animal source	Simple
Partially complete	From plant source	Conjugated
incomplete		Derivative

1. On the basis of quality— Protein is classified on the basis of amino acids present in them because quality of any protein depends on the presence of quantity, type and quality of amino acids.

(i) Superior or complete protein— In these high biological valued proteins all the essential acids are present in adequate quantity and proper ratio. These carry out the function of overall growth and development of the body and perform formative functions. This type of protein is obtained from animal sources such as milk, curd, meat, fish, eggs, liver and from plat sources like dry fruits, soya bean, etc.

(ii) Medium or partially complete protein— In these some essential amino acids are present but one or two essential amino acids are absent. These proteins maintain life but are not useful for physical growth and development. These proteins do not form new nerves and cells. The protein obtained from plant sources such as lentils, cereals, soya bean are medium quality proteins. Cereals lack lysine while lentils lack methionine.

(iii) Inferior or incomplete protein— In these proteins, essential amino acids are totally absent. And so these types of protein are useless in physical growth and development. Incomplete protein is present in stem-root vegetables, fruits and maize. Gelatin in fruits is also an incomplete protein.

2. On the basis of source—

(i) Plant protein— Protein obtained from plant sources is of medium or of inferior quality. Such protein is present in lentils, soya bean, cashew, almonds, groundnuts, dry fruits, etc. This protein can be used as a complete protein in mixed form. For example, lentils lack methionine while in wheat lysine is absent. Lentils and wheat together make a complete protein. Similarly lentils and wheat can be combined with milk or milk products to make complete proteins, for example in *dahi bada*, *kheer*, kedgeree, khichari etc.

(ii) Animal protein— Protein obtained from animal sources is of superior quality. These are complete proteins because the essential amino acids important for body's growth and development are present in it. For example, milk, curd, eggs, meat, fish, liver, cottage cheese, buttermilk, etc.

3. **On the basis of chemical structure—** proteins are divided into 3 categories on the basis of physical characters and solubility.

1. **Simple protein—** These proteins are made up only amino acids. On hydrolysis they give simple units of amino acids. For example—

The protein in yellow part of egg— albumin

Protein in wheat— glutenins, gliadins

Protein in milk— lactoglobulin

Protein in maize— zein

2. **Conjugated protein—** A conjugated protein is a protein that functions in interaction with other chemical groups.

Simple protein + other chemical groups = conjugated protein

These proteins are named on the basis of chemical groups present—

Glycoprotein— simple protein + carbohydrate

Nucleoprotein— simple protein + nucleic acid

Lipoprotein— simple protein + lipid

Haemoglobin — simple protein (globin) + heme (iron)

Phosphoprotein — simple protein + phosphorous

3. **Derived protein—** Derived proteins are formed by partial fragmentation of protein because of physical activities, temperature, somatic stress, digestion. For example-

In milk— casein

In blood clot— fibrin

In boiled eggs— albumin

In digestive juices— peptones, proteoses, peptides

Functions of proteins—

1. **Growth and development of body—** Protein is essential for growth and development. Cells are made up of protein. The repair of damaged cells is also carried out by cells. During infancy, childhood and adolescence protein is important because these stages are of rapid development. Other than this for repair work protein is needed till old age.

2. **For formation and repair of tissues—** Tissues get damaged due to continuous working and different physical activities. Their regeneration and repair becomes important and this is done by protein. The envelope of alimentary canal, production of red blood cells, blood clotting requires protein.

3. **Regulation of different activities of body—**

(i) Protein regulates acids and bases in our body, acts as buffer.

(ii) **For production of hormones—** Different hormones are made up protein molecules and these hormones regulate and control different activities. In the absence of protein, proper production and secretion of hormones does not take place.

(iii) **Contraction of muscles—** Myosin and actin are important for contraction and relaxation of muscles. Myosin and actin are made up proteins.

(iv) **Production of enzymes—** Proteins make enzymes. Enzymes carry out various activities in the body such as digestion of food, oxygenation, metabolism, etc.

(v) **Formation of vitamins—** Some amino acids act as precursors for vitamin formation. For

example, Colin of vitamin B group needs methionine, tryptophan for niacin, etc.

6. **Helpful in normal vision—** cones and rods, present in retina of eyes, form special products in the presence of protein and helps in seeing colours and dyes in dim light.
7. **Providing energy—** in the absence of carbohydrates and fat, protein performs the function of providing energy. One gram of protein gives 4 kilocalories of energy.
8. **Maintaining water balance—** protein present in plasma generates osmotic pressure in the body which maintains the water balance of the body.

Effects of protein deficiency—

The reason for deficiency of protein in the body is lack of protein-rich food items in diet or consumption of incomplete or partially incomplete protein-rich foods for long time. When protein is not present in adequate quantities in the food, it disrupts growth and development of the body. The effect of protein deficiency is known as protein energy malnutrition because protein deficiency leads to deficiency of protein as well as energy. Deficiency of proteins leads to following diseases— (1) Kwashiorkor (2) Marasmus (3) Marasmic Kwashiorkor

(1) Kwashiorkor— it occurs in children of 1-4 years of age. It is caused by lack of protein in diet. This occurs in children whose diet includes carbohydrates but lack protein. Cicely Williams in 1935 reported first about Kwashiorkor. It is an African word which means "disease of a baby deposed from the breast when the next one is born".

1. Growth failure— both growth and development of children get arrested. Also weight and height get stunted.
2. Edema—body swells due to deficiency of protein. Water gets into the cells and tissues of the body. Because of swelling child appears to be healthy.
3. Muscles begin to degenerate. Arms and legs weaken and grow thin.
4. Behavior of child becomes irritating and disinterested. Child feels lethargic, lazy and tired.
5. Hemoglobin cannot be produced due to lack of protein. This results in anemia.
6. Mental development is arrested.
7. Disease resistance capacity reduces and incidence of other diseases increase.

(2) Marasmus— Marasmus occurs in children of 6-12 months of age due to undernourishment. Protein as well as energy deficiency are the main cause. Marasmus is a Greek word meaning "to waste". The main reason for Marasmus is weaning at a very young age and lack of proper and nutritious food. The symptoms of Marasmus are—

Figure : 13.1 Marasmus

1. Physical growth and development stops, height does not increase, drop in body weight.
2. Inflammation and absence of fat from under the skin.
3. Frequent urination due to infection of alimentary canal.
4. Skin becomes dry, rough, dull, and lifeless.
5. Muscle deformation.
6. Limbs become thin and weak.

3. **Marasmic Kwashiorkor—** In under-developed and developing countries where protein- energy deficiency is prevalent, symptoms of both Marasmus and Kwashiorkor appear together. Proper treatment, nutritious food can result in better health of children suffering from Kwashiorkor. But treatment of Marasmus takes time to show tangible results.

Deficiency of protein in pregnant mothers leads to improper development of the foetus. The baby born is slightly built and weak. Sometimes there is scarcity of milk in feeding mothers. Symptoms of deficiency of protein in adults are — loss of body weight, aanemia, loss of disease resistance capacity, presence of illness, etc.

Figure : 13.2 (Kwashiorkor)

Energy— Carbohydrate, protein and fat are main energy producing food substances. Oxygenation of these provides energy. This energy is used for various functions and processes of the body. Energy is required for voluntary activities like running, walking, sleeping, cooking etc. and for involuntary activities like breathing, blood circulation, heart beating, etc. Calorie is the unit of heat energy.

Kilocalorie is the energy needed to raise the temperature of 1 kilogram of water through 1 °C, equal to one thousand small calories.

Oxygenation of 1 gram carbohydrate and protein gives 4 kilocalories of energy and that of 1 gram fat gives 9 kilocalories of energy.

The excess of energy in food causes obesity, increase in weight, other diseases such as diabetes, high blood pressure, heart diseases, etc. Working capacity is also adversery affected.

Deficiency of energy causes weight loss, loss of activity, effect on physical growth, etc.

Water— Water is very important for life**.** After oxygen, water is an essential requirement for survival of life. Water is formed by the chemical combination of hydrogen and oxygen. The chemical formula of water is H_2O. It is an inorganic compound.

Physical organization— Water makes up 60-70% part of our body's weight. Quantity of water is 60-70% in tissues. Bones and teeth also have about 20% of water.

Table : 13.4 Distribution of water in body : At a glance

	% of body weight	Total water present
Total body weight	70 kg	—
Total water quantity	70	49 kg
(1) intra cellular water	50	35 kg
(2) extra cellular water	20	14 kg
(a) interstitial fluid	9	6 l
(b) lymphatic duct	7	5 l
(c) blood vessel	4	3 l

Water is present in all the cells of body but the percentage of water differs in different organs. Water distribution in the body can be divided into 3 categories:

1. **Extra cellular fluid—** this includes 20% of water.
2. **Intra cellular fluid —** this includes 50% of water.
3. **Interstitial fluid—** this includes 9% water, 7% water is present in lymphatic ducts and 4% in blood vessels.

70-75% water is present in the body of children. Slightly built people have more quantity of water in their bodies than people with heavely built bodies. Bodies of men have more water than that of women. With the increasing age water in the body decreases while fat gets stored.

Organs like liver, brain, stomach, small intestines which perform more active functions such as digestion, absorption, and metabolism have more water quantity than other tissues. In contrast, bones and teeth which are inactive for metabolism functions have less quantity of water (20%).

Functions of water—

1. **As a solvent—** Water is an important solvent. All the nutrients in the body are carried by water to different cells. Water is essential for digestion. It also helps in absorption of food and metabolism.
2. **For controlling body temperature—** Water has specific heat. This is the reason why water is capable of maintaining a constant body temperature. Water distributes the body's entire internal heat to all the parts of body. When the body temperature increases water removes excess of heat as sweat which keeps the temperature constant.
3. **As a lubricant—** Water acts as a lubricant in internal organs, joints, and between organs. It keeps the cells moist. Presence of saliva in mouth makes swallowing of food easy. Mucous is present in respiratory system, digestive system, excretion system, etc, presence of water between joints reduces friction. Lack of water in joints at old age causes joint pain.
4. **As a structural unit of body cell—** Cell is the smallest unit of body. Water plays an important role in formation of new cells.
5. **For formative functions—** Water is present in every cell, fiber, tissue of the body. But the amount of water is more in some fibers and less in others. Water is more in active organs where metabolic activities are rapid while less in others.
6. **Protection of soft organs—** Water is present around all the soft organs of the body and protects them from external shocks. Presence of cerebrospinal fluid around the brain is one such example.
7. **Removal of waste products—** It is necessary to remove the waste, harmful substances from our body or produce and accumalate poison in the body. Water removes these waste products with sweat, urine, etc, by dissolving them in itself.
8. **Transportation of nutritive substances—** Water dissolves all the nutrients in itself. Dissolved nutrients get mixed with blood and reach different body organs through blood vessels and lymphatic ducts.

Sources— body takes water from three main sources—

1. **From fluid-rich food items—** Tea, milk, buttermilk, vegetable soup, rice water, fruit

syrup, coconut water, etc.

2. **from solid food items—** Milk, curd, cottage cheese, cereals, lentils, etc.
3. **By oxygenation activity—** Oxygenation of carbohydrates, fat and protein and through metabolism.

Water balance— Water balance is always maintained in the body. In other words, the amount of water lost by the body is equal to the amount taken by the body. This state is known as ideal state.

Water balance = water intake = water loss

Excess or deficiency of water, are harmful for the body.

Water balance is mainly of two types—

1. Positive water balance
2. Negative water balance

Table : 13.5 Water balance in body : At a glance

Excess of water removal from the body	
Dehydration	Thirstiness
Reduction in blood fluidity	Intake of water
Increase in osmotic pressure	Increase in blood fluidity
Excitement of osmotic cells	Decrease in osmotic pressure
Increase in ADH secretion	De-excitement of osmotic cells
Decrease in Diuresis	Decrease of ADH secretion
Increase in absorption capacity of kidney vessels	Frequent urination
Increase in re-absorption of water by kidneys	More urination

1. **Positive water balance—** if the intake of water is more than loss of water from the body it is known as positive water balance.

In this situation, water gets filled in cells and tissues of body. This is so because when there is shortage of protein in blood and osmotic pressure is not normal then water starts filling up in tissue. At this time the extra-cellular fluid increases.

Because of positive water balance amount of sodium increases, protein decreases, edema, liver-related disease occurs.

Positive water balance = water intake > loss of water

2. **Negative water balance—** When loss of water is more than intake of water it is known as negative water balance.

Negative water balance = water intake < loss of water

If body loses 10% of water, absorption of food does not take place properly. The temperature of plasma increases. The plasma and extra-cellular fluid decreases in this situation.

If body loses 15-20% of water, the person dies. Because in this situation extra-cellular fluid increases. It absorbs intra-cellular fluid through osmosis which reduces intra-cellular fluids. It is called intra-cellular dehydration.

Table 13.6 The water balance of an adult—

Water intake by body	**Temperate climate**	**Hot climate**
1. by drinking water	1500	2000-5000
2. by eating food	1000	1000-2000
3. oxygenation of food (metabolism of protein, fat, carbohydrates)	300	300-300
Total water quantity	2800	3300-7300

Loss of water by body	Temperate climate mili liters	Hot climate mililiters
1. By urine from kidneys	1500	1000-1500
2. From skin (by sweat)	800	1800-5200
3. From lungs	400	400-400
4. From stool	100	100-200
Total water quantity	2800	3300-7300

Therefore, it is necessary to have water balance in the body.

Effects of water deficiency in body—

Water is lost from the body continuously. Water is lost in stool, urine, sweat, lungs, etc. Therefore, it is very essential to consume an adequate quantity of water everyday so that there is no deficiency of it in the body. Following are the results of deficiency of water in the body—

1. Imbalance in digestive juices— it results in digestion related problems.
2. Urea, uric acid, poison, toxin are not completely removed from the body. They cause disorders and diseases.
3. A person becomes restive and irritable.
4. Loss of appetite.
5. Loss of body weight
6. Physical growth is affected
7. Increase in body temperature
8. Problem arises in functions of kidneys
9. Decrease in blood fluidity, therefore problem in blood circulation arises.

If 10% water is lost from the body, dehydration occurs.

In case of dehydration, to fulfill the need of water, lemon juice, sugar or salt mixed in water should be given. All the liquid food items such as curd, buttermilk, lentils' water, rice starch, fruit juice, vegetable soups, coconut water, whey water, etc. should be given. Nowadays, free packets of Oral Rehydration Solution (ORS) are available at all health centers, hospitals and mother-child welfare centes. Therefore, solution of ORS in water should be used.

If a person cannot take water orally (from mouth), saline water should be given to his body through blood vessels.

An important point to mention here is if there is less amount of water in body it is called deficiency of water and not dehydration. Dehydration is loss of excess of water from the body.

IMPORTANT POINTS:

1. Different types of nutrients are present in the food. There should be adequate quantity of protein, carbohydrates, fat, mineral salts and water in food.
2. Carbohydrates are main parts of food. Plant sources are main sources of carbohydrates.
3. 1 gram of carbohydrates gives 4.2 kilocalories of energy.
4. Proteins are made up of amino acids. On the basis of presence of amino acids, proteins are complete, partially complete and incomplete proteins.
5. Animal products such as milk, eggs, meat, fish are sources of complete proteins. Proteins help in body's growth and repair functions.
6. Deficiency of protein and energy results in Kwashiorkor, Marasmus and Marasmic Kwashiorkor in children.
7. Carbohydrates such as starch and sugars mainly give energy while fibers are essential for peristalsis of intestines.
8. Water is essential for various biological activities. Without water we cannot stay alive for long.

9. Deficiency of water causes dehydration. In this case, patient should be given ORS, lemon juice, buttermilk, etc.

EXERCISE :

1. Choose the correct option—

(i) Which of the following is monosaccharide?

(a) Sucrose (b) Maltose

(c) Fructose (d) all of these

(ii) Which of the following is called animal carbohydrate or animal starch?

(a) Cellulose (b) Pectin

(c) Glycogen (d) Dextrin

(iii) Which of the following is an essential amino acid?

(a) Histidine (b) Leucine

(c) Lysine (d) all of these

(iv) Protein found in milk is —

(a) Fibrin (b) Casein

(c) Albumin (d) Z ein

2. Fill in the blanks—

(i) ———— is a milk protein.

(ii) Fat is soluble in ————-

(iii) The chemical formula of water is ———

(iv) Total quantity of water in body is ———

(v) ———— helpful in growth and development in body.

(vi) ———— is caused by deficiency of protein.

3. Classify carbohydrates on the basis of molecular structure.

4. Explain the classification of protein in short.

5. Explain the role of hormone in water and electrolyte balance.

6. Throw some light on importance of water and fibers.

ANSWERS :

1. (i) c, (ii) c, (iii) d, (iv) b

2. (i) lacto-albumin (ii) benzene, ether
(iii) H_2O (iv) 70% (v) protein
(vi) kwashiorkor, Marasmus, marasmic kwashiorkor

CHAPTER : 14

NUTRIENTS — MICRONUTRIENTS

Vitamins— vitamins are active organic elements which are important for good health of the body. Though these are required in minute quantities they are important for growth, development, vivacity and liveliness.

History— Before 19th century, scientists knew only about carbohydrates, protein, fat and mineral salts. At that time nobody knew about vitamins. In the beginning of the 20th century, some scientists experimented artificial food mixture containing carbohydrates, fat, proteins and mineral salts on mice and it was observed that growth was arrested because of this artificial food. Thus, it was concluded that some other element along with these four elements was also required in food.

The word 'Vitamin' was given in 1912 by Casimir Funk. Funk on observing that an element obtained from the upper shell of rice cured Beri Beri, thus confirming Eijkman's assumption that beriberi was caused by the deficiency of a particular food element. This element is essential for life and nitrogen is present in the beriberi anti- element. This way the name 'vitamine' was given. Later on was found that nitrogen was not present in all the vitamins and thus 'e' was dropped from the name and only 'vitamin' came into Vogue.

If vitamin are not present in adequate quantities in the diet then vitamin-deficiency diseases develop. From the study of these diseases it has been found that a vitamin is not a single element but is a variety of elements.

Classification of vitamins— on the basis of solubility, vitamins can be divided into water-soluble and fat-soluble.

1. Water-soluble vitamins— water-soluble vitamins are not produced in the body but should be included in the diet. As these are soluble in water therefore excess of these vitamins is removed along with water from the body.

(1) Vitamin B- complex

(i) Vitamin B_1 or thiamine

(ii) Vitamin B_2 or riboflavin

(iii) Nicotinic acid or niacin or nicotinamide

(iv) Vitamin B_6 or pyridoxine

(v) Pantothenic acid

(vi) Folic acid

(vii) Choline

(viii) Biotin

(ix) Para amino benzoic acid

(x) Vitamin B_{12} or cyanocobalamin

(2) Vitamin 'C' or ascorbic acid

2. Fat-soluble vitamins— some of these vitamins are produced in the body but not in adequate quantities. Therefore, for the requirement of these vitamin one has to depend on food.

(i) Vitamin 'A' or carotene
(ii) Vitamin 'D'
(iii) Vitamin 'E'
(iv) Vitamin 'K'

Difference between water-soluble and fat-soluble vitamins-

Table : 14.1

Fat-soluble vitamins		Water-soluble	
1	Soluble in fat and fat solution.	1	Soluble in water.
2	Excess of these gets stored with fat.	2	Excess of these is removed from the body with water.
3	The symptoms of their deficiency appear slowly.	3	The symptoms of their deficiency appear fast.
4	In these vitamins only carbon, oxygen and hydrogen molecules are present.	4	In these vitamins along with carbon, oxygen and hydrogen, nitrogen is also present. Sometimes sulphur, cobalt is also present.
5	These are absorbed by lymphatic system.	5	These are absorbed by blood.

Fat-soluble vitamins

Vitamin 'A'

Vitamin 'A' is a fat-soluble vitamin. Vitamin A is present only in animal-based food products. In plant-based food products, carotenoids are present which get converted into vitamin A in the body. Carotenoids are thus also known as pro-vitamin A.

Types of vitamin A

Vitamin A is mainly of 4 types. In some food items more than 1 type of vitamin A is present.

(1) Vitamin A (Retinol) — it is also called as Retinol. It is present only in animal-based food products.

(2) Vitamin A aldehyde— it is also called Retinal. It is present in the Rhodopsin and Iodopsin pigment of rods and cones in the retina of eyes. This vitamin is helpful in providing eye sight.

(3) Vitamin A, retinoic acid— it is produced in the body and is essential for the physical growth and development.

(4) Vitamin A_2— it is present in the liver of fresh-water fish. It is a less-active vitamin.

β carotene— it is found in plant- based food sources. It is granulated and dark-red in color. It is very important and useful for health of the body. This gets converted into vitamin 'A' in the body.

Functions of vitamin 'A'—

1. Providing normal eyesight to the eyes— vitamin A is essential for the health of eyes. There are two types of cells present in the retina of eye. Rods and cones help in seeing in dim and bright light and also in identifying dyes. Color-providing pigments are also present in these rods and cones. Rhodopsin pigment is present in rods and Iodopsin in cones. A protein called Opsin is present in them. Vitamin A aldehyde combines with Opsin protein and changes into Rhodopsin which is also known as 'Visual Purple'. In the presence of light, Rhodopsin gets converted back into vitamin A aldehyde and Opsin. In this way, formation of Rhodopsin takes place in dim light and iodopsin in bright light. This cycle goes on uninterrupted.

Thus, the ability of eyes to see in light depends on vitamin 'A'.

2. **For the health of epithelium tissues—** Vitamin A is helpful in maintaining activity and stability of epithelium tissues. All the external and internal organs of our body are covered with this epithelium tissue. This tissue secretes mucous and protects the organs from bacteria, viruses and germs. Vitamin A helps in this secretion and thus helps in keeping skin and organs soft, moist and gentle.
3. **Physical growth and development—** Vitamin A plays an important role in physical growth and development. Many researchers have proved that in the absence of vitamin A, cell division process is reduced by 30%. Therefore vitamin A helps in physical growth and development.
4. **Helpful in maintaining health of reproductive organs—** Vitamin A plays an important role in maintaining health and activity of reproductive organs. Deficiency of vitamin A leads to low secretion of sexual hormones. As a result disorders develop in male and female reproductive organs.
5. **Helpful in growth of bones—** Vitamin A is essential for normal growth and development of bones.
6. **Resistant to infections—** Vitamin A resists infections in the body. it provides strength to epithelium tissues as a result infection does not occur immediately.
7. **Maintaining health of nervous system—** Vitamin A is essential for activity of tissues of nervous system. In the absence of this myelin sheath gets destroyed and disorders develop in nervous system.
8. **Synthesis of glycoprotein—** Vitamin A plays an invaluable role in the synthesis of Glycoprotein. In the absence of this vitamin, chances of stones in liver and kidneys increase.
9. **Maintaining health of white blood cells—** Vitamin A is essential for maintaining health of white blood cells. In the absence of vitamin A number of WBCs reduces or Leucopenia occurs.
10. **Synthesis of protein—** Vitamin A helps in synthesis of protein. In the absence of vitamin A metabolism of Ribonucleic acid does not take place properly. Consequently activity of protein is affected.

Effects of deficiency of Vitamin A—

1. **Night-blindness—** deficiency of vitamin A causes night blindness. It is a condition making it difficult or impossible to see in relatively low light, especially when the patient walks from light to darkness or from bright sunlight to a room.

Figure : 14.1 Night-blindness

Figure : 14.2 Bitot's spots

2. **Xerophthalmia—** It is abnormal dryness of the conjunctiva and cornea of the eye, with inflammation and ridge formation, typically associated with vitamin A deficiency. This is mainly due to keratinization of cornea because of which the internal part of cornea appears as

smoky cloud. Over a period eyes lose their sight.

3. **Bitot's spots—** Bitot's spots are the buildup of keratin located superficially in the conjunctiva, which are oval, triangular or irregular in shape
4. **Xerosis conjunctivae—** Deficency of Vitamin causes conjunctiva to grow thick and dry. Sometimes it gets wrinkles or other injury.
5. **Xerosis cornea—** It is the dryness of the cornea because of lack of tears.
6. **Keratomalacia—**It is an eye disorder that results from vitamin A deficiency. In this disorder, cornea becomes soft, injured and infected with bacteria. The resulting cornea becomes totally opaque, which is one of the most common reasons for blindness.
7. **Phrynoderma—** Due to deficiency of vitamin A sweat glands do not work properly and so sweat is not formed and skin turns dry, rough and hard.
8. **Interrupted physical growth—** If the deficiency of vitamin A prolongs growth and development of bones does not take place properly.
9. **Decreased reproductive activity—** Vitamin A deficiency affects male reproductive organs. Hormone secretion lessens and less sperms are formed.

Effect of over-availability of vitamin A—

Over availability of vitamin is harmful as much as deficiency of vitamin A. Over-availability of vitamin is known as hypervitaminosis.

Effects of excess of vitamin A—

1. Loss of appetite
2. Joint pain
3. Bleeding in retina of eye
4. Liver enlargement
5. Swelling in bones of legs
6. Headache and irritation
7. Difficulty in breathing
8. Hair loss
9. Blisters and pimples on lips

Treatment of deficiency of vitamin A—

If there is deficiency of vitamin A then 10,000 µg of vitamin A should be given for 10 days. If there is over-deficiency then 50,000 µg of vitamin A should be given for a few weeks.

Sources of vitamin A—

Vitamin A is mainly present in liver oil of fish. Other sources are— fish oil, liver, eggs, butter, milk,

Figure : 14.3 (Sources of vitamin 'A')

etc. plant based sources are— leaves of Amaranth, coriander leaves, carrots, drumstick leaves, mint leaves, spinach, etc. are sources of ß carotene.

Vitamin 'D'—

Vitamin D is an important fat-soluble vitamin. This vitamin works against bone deformities.

Types of vitamin D—

Rickets resistant substances and sterol compounds are combined together to form vitamin D.

Figure : 14.4 (Rickets)

Vitamin D is of two main types-

1. **Vitamin D_2—** It is called Ergosterol or pro-vitamin D. it reacts with ultraviolet rays of sun to form Calciferol. It is found in mold and yeast.
2. **Vitamin D_3—** it is also called 7-dehydrocholesterol. It is present under the skin and reacts with ultraviolet rays of sun to get converted into vitamin D.

Functions of vitamin D—

1. **Helpful in absorption of calcium and phosphorous—** Vitamin D controls the amount of alkaline phosphatase enzyme which helps in increasing the absorption rate of calcium and phosphorous by bones. In the absence of vitamin these mineral salts are not absorbed. As a result much of calcium and phosphorus gets removed from the body. Consequently bones and teeth do not develop properly.
2. **Controlling the amount of calcium and phosphorus in blood—** Vitamin D controls the amount of calcium and phosphorous in the body. When both these minerals are in lesser quantity in blood, they move from bones into the blood and thus maintain the balance of calcium and phosphorous levels in blood.
3. **For physical growth—** vitamin D plays an invaluable role in physical growth and development. Deficiency of this vitamin reduces the absorption rate of calcium and phosphorus and physical growth is affected.
4. **Controlling parathyroid gland—** vitamin D controls and regulates the secretion of hormones from parathyroid gland.
5. **Vitamin D** helps in synthesizing the activity of protein in mucosa of small intestine.

Effects of deficiency of vitamin D—

Deficiency of vitamin D leads to increased levels of alkaline phosphatase in blood. As a result, calcium and phosphorous do not get absorbed properly in the intestines. Thus the bones and teeth become weak. Following disorders occur due to deficiency of vitamin D—

1. **Rickets—** It commonly affects children. In this disorder, there is an acute deficiency of vitamin D, calcium and phosphorous in the body. It mainly affects people living in populated, industrial areas where they do not get proper sunlight.
2. **Muscle twitching—** Deficiency of vitamin D causes irregularity in metabolism of calcium and phosphorus and this leads to muscle twitching.
3. **Teeth rotting—** Deficiency of vitamin D teeth delays teeth growth in children. Calcium phosphate does not get deposited in enamel and dentin of teeth. Thus Healthy teeth are not formed.

4. **Osteomalacia—** it is a term for rickets in adults. In this disorder, due to deficiency of vitamin D or calcium thus calcification in bones does not take place properly. It is common in pregnant and feeding mothers who mostly take plant-based food and stay confined in houses. In this disorder bones become soft and get bent. Bone breaking becomes common.
5. **Osteoporosis—** it commonly found in adults where bones grow weak and disabled. Bones break on slightest injury or fall.

Table : 14.2 Vitamin 'D' Defeciency

Rickets	Tetany	Rotting of teeth	Osteomalacia
In children (6 months- 2-1/2 years)		In children	In adults
Symptoms:	**Symptoms:**	**Symptoms:**	**Symptoms:**
1. late filling of sinciput	1. sharp pain in limbs	1. rotting of teeth	1. weakness of bones
2. softening of bones of skull	2. pain and spasms	2. unhealthy teeth	2. pain in back and thighs
3. elongation of long bones		3. deformed teeth	3. bending of backbone
4. protuberance in rib bones		4. delayed growth of teeth	4. weakening of muscles
5. joint pain			5. under-developed pelvic cavity
6. disturbance of digestion process			
7. lethargy			
8. irritation			

Effects of excess of vitamin D—

Excess of vitamin D causes loss of appetite, nausea, vomiting, thirst and diabetes insipidus. A child feels lethargic and weak and deterioration of muscles. Excess of vitamin D causes calcium deposition in arteries, kidneys and lungs leading to death.

Sources of vitamin D—

Vitamin D is present in only some animal based food products. Vitamin D is obtained from sunlight and from sources such as liver oil of fish, fat-rich fishes, eggs, butter, cottage cheese, fat-rich milk, etc.

Vitamin E—

In 1922 Evans and Bishop experimented on mice and reported that a fat-soluble element is necessary for reproduction in mice. This element was named as vitamin 'E' which is helpful in production of offspring. This vitamin is also known as infertility impeding vitamin. According to its chemical structure it is named as β tocopherol.

Types of vitamin E— this vitamin is mainly found in two forms—

(1) Tocopherol

(2) Tocotrienol

Between both these forms, tocopherol is more active. It is also of 3 types— alpha (α), beta (β), gamma (γ)

Functions of vitamin E—

1. **Preventing oxidization of vitamin A and carotene—** Vitamin E has anti-oxidizing properties. Th at is why vitamin E is able to

prevent oxidation of vitamin A and carotene in intestines. Thus, it prevents vitamin A and carotene from getting destroyed.

2. **Formation of red blood cells**— vitamin E plays an important role in formation of red blood cells. It prevents RBCs from getting damaged by oxidizing agents. Thus it increases the life the span of RBCs.
3. **Maintaining integration of cells—** vitamin E helps in maintaining integration of cell covering. In the case of deficiency of vitamin E this creative integration gets damaged.
4. **Helpful in reproduction—** vitamin E helps in normal reproduction.
5. **Metabolism of nucleic acid and protein—** Vitamin E plays an important role in metabolism of nucleic acids and protein. It is helpful in synthesis of heme protein.
6. **Vitamin E** provides protection to liver against various poisonous substances. Different sexual hormones, cholesterol and vitamin D are affected by the presence of vitamin E.

Effects of deficiency of vitamin E—

1. **Reduction in reproduction capacity—** because of decreased vitamin E reproductive organs do not work properly. There is an imbalance and problems in secretion of sexual hormones. In females, foetus dies during gestation period and in males, sperm producing cells get destroyed.
2. **Liver necrosis—** Vitamin E protects liver against poisonous and harmful substances. When there is deficiency of vitamin E in the body, the harmful substances start depositing in liver. As a result, liver cells start getting damaged
3. **Erythrocyte hemolysis—** Deficiency of vitamin E causes damage of RBCs. Bone marrow is unable to produce RBCs rapidly and this gives rise to anemia.
4. **Muscle twitching—** Muscles become weak due to deficiency of vitamin E and they start contracting unnecessarily.

Sources of vitamin E— Many plant seed oils are main sources of vitamin E. vegetable oils and fats too are rich in vitamin E.

Vitamin 'K'

The presence of vitamin K was first reported by Dr. Dam. In 1934, experiments on chicken led to the knowledge that vitamin K helps in blood clotting. This vitamin is bleeding- resistant vitamin.

Types of vitamin K

Vitamin K is mainly of 2 types—

1. Vitamin 'K_1'— It is present in green leafy vegetables. It is also known as phylloquinone.
2. Vitamin 'K_2'— It is present in rotten fishes. It is also known as menaquinone.

Functions of vitamin 'K'—

1. **Blood clotting—** Vitamin K helps in blood clotting. It is helpful in formation of prothrombin. Prothrombin converts into Thrombin which gets converted into Fibrin. Fibrin clots the blood. Platelets and other blood factors from The blood with damaged tissues form Thromboplastin. These blood factors work in combination with calcium ions and blood plasma and make prothrombin active. Active Prothrombin reacts with blood factors to form a new substance called Thrombin. A soluble protein called Fibrinogen, present in blood plasma, reacts with Thrombin and converts

Fibrinogen into insoluble Protein fibrin. The blood cells get entrapped in this Fibrin and blood clots. In the absence of vitamin K Prothrombin is not formed. Therefore, blood clotting does not take place.

Effects of deficiency of vitamin K—

Low volume of Prothrombin in blood— deficiency of vitamin K decreases the volume of Prothrombin in blood, which prolongs the period of blood clotting. This causes excess of bleeding. When there is an internal or external injury, excessive blood flows caused by the rupture of a blood vessel. This is known as hemorrhage.

Effects of excess of vitamin K—

Vitamin K in excess causes damage of red blood cells which leads to hemolytic anemia. Symptoms of this anemia are— nausea, vomiting, dizziness, yellowing of skin, etc.

Sources of vitamin K—

Vitamin K is present in various plant-based food products. Some bacteria in our intestines also forms vitamin K. Green leafy vegetables are main sources of vitamin K. Cereals, lentils, eggs, milk, meat and fish are also good sources.

Water soluble vitamins—

Vitamin 'C' (Ascorbic acid)

Vitamin C is also known as Ascorbic acid. Vitamin C came into light when treatment and reasons for scurvy disease were discovered. These are white shaped crystals and are soluble in water. They are readily oxidized, especially in the presence of base, temperature, light and copper.

Functions of vitamin 'C'—

1. **Formation of collagen and intra-cellular substances—** Vitamin C forms intra-cellular substances which help in binding tissues such as cells, bones, teeth, connective tissue.
2. **Helpful in absorption of iron—** vitamin C converts ferric salts into ferrous salts which get absorbed in to the alimentary tract.
3. **As a co-enzyme—** vitamin C acts as a co-enzyme for various metabolic activities.
4. **Formation of bones—** vitamin C contributes in growth, development and formation of bones. Deficiency of this vitamin causes some changes in bones because bone matrix and other allied substances are not formed properly.
5. **As an anti-oxidant—** Vitamin C works as an important anti-oxidant. It helps in maintaining activily of white blood cells and protects the body against infections.
6. **Maintaining health of blood vessels—** Vitamin C keeps blood vessels healthy and provides strength and firmness to the walls of vessels.
7. **Healing of wounds—** vitamin C forms collagen which helps in healing of wounds.
8. **Increasing disease-resistance capacity—** Vitamin C protects cell damage during incidence of diseases such as tuberculosis, pneumonia etc. Vitamin C increases disease-resistance capacity.

Effects of deficiency of vitamin 'C'—

Deficiency of vitamin C for a long time causes scurvy.

Scurvy is of two types—

(1) **Scurvy in adults—** survey in adults occurs due to consumption of food lacking in vitaminC.

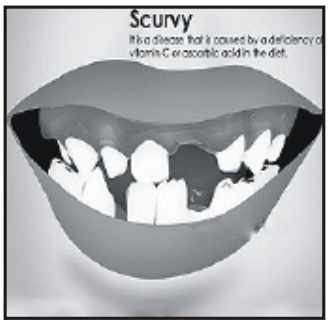


Figure : 14.5 (Scurvy)

Symptoms—

(i) Weakness, weight loss

(ii) Lethargy, laziness and fatigue

(iii) Because of deficiency of vitamin C, iron is not absorbed properly leading to anemia.

(iv) Skin becomes dry, rough, yellow and dull

(v) Gums get dried and teeth weaken leading to tooth loss.

(vi) Body muscles become inactive

(2) Scurvy in children— deficiency of vitamin C in children causes scurvy. This disease does not occur in children below 6 months. It occurs in children betyween age 6-12 months. Scurvy is a very dangerous disease in children.

Symptoms—

(i) Children become irritable, lazy and lethargic.

(ii) Swelling and pain in legs

(iii) Walls of blood vessels get damaged

(iv) Healing of wounds takes place slowly

(v) Swelling in gums, mouth seems to stink

(vi) Chest bones curved in

(vii) Difficulty in breathing, body turns blue, twitching of body occurs and the child dies.

Sources of vitamin 'C'—

Gooseberry and guava are best sources of vitamin C. all sour fruits such as lemon, oranges,

Figure : 14.6 (Sources of vitamin 'C')

sugarcane, mango, papaya and vegetable such as tomatoes, amaranth, cauliflower, coriander leaves, drumstick leaves, radish leaves are good sources of vitamin C. spouted grains and lentils also have good quantity of vitamin C.

Vitamin B_1 (Thiamine)

Thiamine was discovered while treating Beriberi. Mostly Beriberi is seen in people consuming polished rice as a staple diet.

Thiamine is readily soluble in water. It is stable in acidic medium. In basic medium it gets destroyed even at room temperature. Using soda in food destroys thiamine.

Functions of thiamine—

1. Helpful in metabolism of carbohydrates— in our body, thiamine combines with phosphate to form thiamine pyrophosphate which helps in metabolism of carbohydrates.
2. Helpful in digestion— thiamine keeps the muscular motion of digestive system normal.

3. Helpful in maintaining normal rate of pulse— thiamine pyrophosphate is extremely important for carbohydrate metabolism. In the absence of pyrophosphate metabolism of carbohydrates does not take place properly as a result it cannot reach the muscles and tissues of pulses. As a result abnormality occurs.
4. Helpful in DNA and RNA formation— thiamine is important for the formation of DNA and RNA.
5. Thiamine increases germ killing capacity of white blood cells.
6. Thiamine plays an important role in keeping internal organs healthy and functional.

Effects of deficiency of thiamine—

Thiamine deficiency is common in people who consume alcohol. Also people who consume carbohydrates in large quantity and consume lentils, green vegetables, etc in less quantity.

Deficiency of thiamine causes Beriberi. It can be divided into 3 types—

(1) Dry Beriberi (in adults)

(2) Wet Beriberi (in adults)

(3) Infantile Beriberi (in children)

1. **Dry beriberi—** it occurs in adults. It is known as dry beriberi because in this muscles get damaged severely and as a result a person becomes skinny.

Symptoms— the vascular system gets affected. There is decreased muscle function, loss of sensation in legs, mental confusion, irritation, suicidal tendency are some of the symptions of abnormality of nervous system.

2. **Wet beriberi—** because of the occuraunce of inflammation in the body this type of beriberi is known as wet beriberi. Inflammation begins from legs and reaches arms, face and neck.

Symptoms— heart becomes weak and there is unnatural change in heart rate, breathing becomes difficult. If Beriberi is not treated on time it may result in death due blockage in the heart.

3. **Infantile beriberi—** it occurs in children. If there is deficiency of vitamin B_1 in feeding mother or if the mother consumes polished rice in large quantity, deficiency of vitamin B_1 is seen in feeding mother's milk. As a result there occurs deficiency of this vitamin in feed consuming babies. This disease can also be found in children who consume thiamine deficient food.

Symptoms— muscles are damaged in this disease. Water gets filled up in the body. Heart and liver grow in size. Loss of appetite and damage to digestive capacity, vomiting, diarrhoea are some other symptoms.

4. **Wernicke-Korsakoff Beriberi—** this disease is a result of excess of thiamine deficiency, especially in people who daily consume large quantities of alcohol.

Symptoms— eye muscles weaken and the rate of moving of eyeball increases unusually. Walk becomes abnormal.

Figure : 14.7 (Beriberi)

Sources of thiamine— whole grains are main sources of thiamine. Thiamine is present in oil seeds, green vegetables, green peas, liver etc.

Vitamin B_2 (Riboflavin)

A pentose sugar called 'ribose' and an iso centre is present in riboflavin. It is readily soluble in water and gets damaged by light and ultraviolet rays of the sun.

Functions of riboflavin—

1. **Regulation and controlling of hormones—** riboflavin plays an important role in the formation of enzymes that are responsible for the metabolism of carbohydrate, fat and proteins. Riboflavin is important for activity of insulin hormone.
2. **Maintaining health of skin—** riboflavin helps in keeping skin beautiful, attractive, hydrated and glowing.
3. **Maintaining health of eyes—** riboflavin is essential for the health of eyes. In the absence of riboflavin, blood cells in eyes get damaged.
4. **Helpful in physical growth—** riboflavin provids nutrition to body cells. It is essential for releasing power in body cells.

Effects of deficiency of riboflavin—

1. Skin injuries— deficiency of riboflavin affects face, skin, eyes and vascular system. Skin becomes red and injured. Inflammation of the corners (angles) of the lips which sometimes bleed is known as angular stomatitis. Cheilosis is a painful inflammation and cracking of the corners of the mouth. Ulcers on the tongue is a common effect of deficiency. The color of tongue changes from natural to somewhat dark and it is known as glossitis.

Figure : 14.8 (Riboflavinosis)

2. Effect on eyes— deficiency of riboflavin affects eyes. Light resistance power of eyes reduces and a sticky substance is secreted from eyes permanently which if not treated may lead to loss of eyesight.
3. Physical growth is disrupted and there is loss of appetite. Digestive capacity reduces.
4. Riboflavin deficiency causes soreness of testicles in men.

Sources of riboflavin— riboflavin is found mainly in liver, dry yeast, eggs, meat, fish, whole grains, lentils and green leafy vegetables.

Vitamin B_3 (Niacin)—

Niacin element was discovered because of pellagra disease. Niacin is also known as 'pellagra preventing vitamin'. Pellagra is an Italian word and is formed from two words— 'pelle' meaning coarse and 'agra' meaning skin in Italian.

Figure : 14.9 (Pellagra)

Functions of Niacin—

1. Metabolism of carbohydrates, fat and protein— niacin plays an important role in the metabolism of carbohydrates, fats and proteins.
2. Maintaining health of vascular system— niacin is helpful in keeping vascular system healthy.
3. Helpful in physical growth— niacin is helpful in increasing the rate of physical growth.
4. Health of eyes— niacin is helpful in converting vitamin A in retinol and thus, is helpful in keeping eyes healthy and maintaining vision of eyes.
5. Niacin is important for keeping skin healthy.

Effects of deficiency of Niacin—

Prolobged deficiency of niacin in food for many months, gives rise to pellagra. Pellagra is also known as 3D's disease. This is so because there are 3 symptoms of this disease and all begin with a 'D'.

1. **Diarrhea—** diarrhoea is a result of abnormality in digestive system and its orgars. The mucosa of lips gets damaged, as a result mouth does not open properly and tongue, and throat is affected. Tongue and lips darken and swallowing of food becomes difficult.
2. **Dermatitis—** deficiency of niacin causes dermatitis. The parts of body that are not covered and receive direct sunlight are affected more than the other parts. Skin becomes coarse and red, rashes appear and injury may occur.
3. **Dementia—** dementia is a serious symptom of pellagra. If pellagra becomes serious then dementia begins to appear. Vascular system becomes abnormal and patient remains tense. Memory of the patient reduces and fainting spells begin. Patient begins to involuntarily urinate and defecate.

Sources of Niacin— the main sources of Niacin are dry yeast, liver, groundnut, whole grains, lentils, meat, fish, milk, eggs and other vegetables.

Vitamin B_{12}—

Vitamin B_{12} is an important vitamin of vitamin 'B' group. In this vitamin cobalt, an important mineral salt is present. Because of the presence of cobalt, it is known as cyanocobalamin.

Functions of vitamin B_{12}—

1. Vitamin B_{12} works like a co-enzyme.
2. Vitamin B_{12} is essential for the maturity of RBCs.
3. It plays an important role in metabolism of carbohydrates, fats and proteins.
4. Vitamin B_{12} increases hunger and prevents fat accumulation in liver.
5. It is helpful in metabolism of folic acid and other metabolic activities of vascular tissues.

Effects of deficiency of vitamin B_{12}—

Deficiency of vitamin B_{12} causes pernicious anemia. When intrinsic factors are not present in adequate quantities in stomach juice, absorption of vitamin B_{12} does not take place properly. This causes deficiency of vitamin B_{12}.

Symptoms of pernicious anemia—

1. Ulcers in mouth.
2. Loss of stomach cells that make intrinsic factor.
3. Changes in external form of bone marrow.
4. Acute decrease in number of RBCs
5. Reduction of hemoglobin levels in blood
6. Skin turns yellow
7. Abnormality in blood vessels

Sources of vitamin B_{12}—

Vitamin B_{12} is mainly found in animal based food sources. It is completely absent in plant based food sources. Liver of sheep, goat, pig, ox, etc is a good source of this vitamin. Meat, fish, eggs also contain vitamin B_{12} in good quantity. It is also found in milk.

Folic acid

Folic acid cures anemia due to innutrition in

humans, animals and birds. It acts as a growth factor in micro organisms.

Functions of folic acid—

1. Folic acid along with vitamin B_{12} is essential for formation and maturity of RBCs in bone marrow.
2. Folic acid works as a co-enzyme in the formation of purines and pyrimidines.
3. Folic acid plays an important role in metabolism of histidine, tyrosine and tryptophan.
4. Folic acid has an important role in different biological and chemical processes of the body.

Effects of deficiency of folic acid—

Due to deficiency of folic acid formation of RBCs lessens and number of RBCs reduces. It is known as megaloblastic anemia. In megaloblastic anemia percentage of hemoglobin in blood reduces drastically and number of RBCs also decreases. This type of anemia is mostly seen in children belonging to under developed and developing nations.

Effects of excess of folic acid—

Folic acid is partially soluble in water. The extra quantity of folic acid is not excreted with urine. Consequently the excess of folic acid accumulates in kidney as stone.

Sources of folic acid—

Folic acid is found in dry yeast, liver, wheat embryo, upper layer of rice, whole grains, and lentils and green leafy vegetables.

Mineral salts–

In addition to carbohydrates, fat, protein and vitamins one more element is present in the body which is called mineral element. This element is helpful in the growth and formation of body. The leftovers after burning of plant and animal tissues are actually mineral element. 4% of our body weight is made up of mineral elements. These mineral elements are inorganic, in other words carbon is absent in these mineral salts.

On the basis of quantity, mineral salts in the body can be divided into 2 parts–

1. Main minerals/ major mineral element— the mineral elements which are present in large quantities in the body are main minerals. These are taken up in the food substances that we eat.
2. Accessory minerals/ minor mineral elements— these elements are required in minor quantitiy in the body. These mineral elements play an important role in monitoring the physical activities.

Table No. 14.3: classification of mineral elements

Main mineral elements	Accessory mineral elements
Calcium	Iron
Phosphorus	Manganese
Potassium	Copper
Sulphur	Cobalt
Sodium	Aluminium
Chlorine	Selenium
Magnesium	Zinc
	Fluorine
	Bromine
	Iodine
	Chromium
	Cadmium
	Molybdenum
	Silicon
	Nickel
	vanadium

Calcium—

Calcium is present in large quantity in our body compared to other mineral salts. The quantity of calcium is the largest out of all mineral elements. Half the quantity of all mineral elements or 2% of our body weight is made of calcium. 99% of calcium in the body is present in our bones and teeth and the remaining 1% is present in soft tissues, blood serum and fluid substances.

Functions of calcium—

1. Formation of bones and teeth– during foetal development a strong but flexible protein matrix starts forming for bone formation. With aging calcium gets deposited in cartilage which changes into bones. This is so because with aging calcium, phosphorus and other mineral salts start depositing in the protein matrix and the matrix becomes stiff. Consequently bones become rigid. Like in bones, in teeth also large quantity of calcium is present.
2. Physical growth and development– the deficiency of calcium affects protein in the body. Protein is essential for physical growth and development of the body.
3. Helpful in blood clotting– calcium is helpful in blood clotting.

   Blood platelets → thromboplastin

   Thromboplastin + calcium + vitamin K + tryptan enzyme = prothrombin

   Prothrombin + Ca^{++} + vitamin K + blood factor CV & VIII = thrombin

   Thrombin + fibrinogen = fibrin

   Fibrin + blood cells = blood clot
4. Monitoring of muscular contraction– calcium helps in monitoring of muscle contraction and relaxation and thus helps in keeping them active.
5. Balancing heart rate– for heart muscles, calcium has to be present in adequate quantity in the fluid substances of covering fibers.
6. Calcium is helpful in activating enzymes.
7. Calcium regulates movement of fluids across cell membranes.

Effects of deficiency of calcium—

1. Growth is disrupted in the absence of calcium. Because of calcium deficiency process of calcification cannot take place. Weakening bones and their malformation is known as 'rickets'.
2. Deficiency of calcium in adults causes 'osteomalacia'. In this disease, dissolution of calcium from bones increases. As a result a slight injury results in breaking of bone.
3. Deficiency of calcium during pregnancy leads to absorption of calcium by the foetus from mother's body. As a result, pelvic girdle in pregnant lady becomes narrow.
4. In old age, due to calcium deficiency bones become weak. This condition is known by the name of osteoporosis.

Effects of excess of calcium—

Excess of calcium in body is called 'hypercalcemia'. Excess of calcium can be seen both in children and adults. In this situation, there is loss of appetite. Nausea, vomiting, muscle fatigue are common symptoms. Calcium increases in blood and levels of urea, plasma, cholesterol also increase.

Sources of calcium— all milk products (fresh butter, powder milk, buttermilk, etc) are good sources of calcium. Other sources are green leafy vegetables, cabbage, cauliflower, turnip, mustard, lentils, dry fruits, etc.

Figure : 14.10 (Fluorosis)

Phosphorous—

After calcium, quantity of phosphorous is the highest. 1% of our body weight consists of phosphorous. 80% of total phosphorous combines with calcium to form calcium phosphate which forms bones and teeth.

Functions of phosphorous—

1. Formation of bones and teeth– phosphorous combines with calcium and forms calcium phosphate which is an insoluble salt and plays an important role in formation of bones and teeth.
2. Phosphorous is an important and essential mineral salt in the formation of nucleoprotein and nucleic acid.
3. It plays an important role in metabolism of carbohydrates.
4. It acts as a buffer because of its capacity to combine with more hydrogen ions.
5. Phosphorous is helpful in producing energy the process of .
6. It helps in formation and development of cells.
7. Phosphorous increases calcium absorption in the body.

Effects of deficiency of phosphorous—

Phosphorous is present freely in most of the food items therefore there are no effects of deficiency. But those who consume more, and have deficiency of phosphorous. The symptoms of this type of deficiency are fatigue, loss of appetite, demineralization of bones.

Sources of phosphorus—

The food which contains calcium and protein in adequate quantities will also contain calcium in good amount. Milk, eggs, meat, fish, chicken, wheat, sesame, oat flour are good sources of phosphorous. Cereals, lentils, dry fruits, peas, beet root, almonds etc are other sources of phosphorous.

Iron—

In our body, Iron is present in small quantity but it is an important element for our body. In the body of a normal person, 4-5 grams iron is present. It is an essential element for keeping body healthy.

Functions of iron—

1. Iron is an important mineral salt for the formation of hemoglobin in blood. Heme iron and globin protein is present in hemoglobin. In the absence of heme iron hemoglobin formation does not take place.
2. Iron is present as myoglobin in muscles which is essential for contraction process.
3. Iron is important for the formation of enzymes participating in respiratory process.
4. It forms immune cells.

Effects of deficiency of iron—

Deficiency of iron causes anemia. Anemia is a condition that develops when your blood lacks enough healthy red blood cells or hemoglobin. This disease is more prevalent in pregnant mothers and infants of 1 year who have stopped taking mother's milk. Because of anemia skin of baby turns yellow. Growth and development of children slows down. During pregnancy more iron is required for blood formation in foetus. If the demand of iron is not fulfilled symptoms like difficulty in breathing, dizziness, yellowing of skin, etc appears.

Sources of iron—

Eggs, meat, liver, dry fruits like raisins, plum are good sources of iron. Green leafy vegetables, lentils, millet, jaggery, sesame, mint, *ragi*, etc are good sources of iron.

Type	Mineral salt	Functions	Effects of deficiency	Sources
Main mineral elements	Potassium	• Regulation of acid-base balance • Balancing fluid substances in body • Helpful in muscle contraction • Synthesis of glycogen • Helpful in growth and development of body	• Painful muscle contraction • Irritation and anger • Lethargy • Imbalance in heart beat rate • Weakening of muscles	Lentils, oil seeds, milk, cottage cheese, eggs, meat, fish, chicken, vegetables and fruits
	Sodium	1. regulating heart beat rate 2. helpful in water balance 3. helpful in nerve stimulus 4. helpful in absorption of amino acids and carbohydrates 5. helpful in muscle contraction	1. nausea 2. weakness, lethargy 3. intense painful muscle contraction 4. muscle spasm	Milk, meat, fish, eggs, curd, lentils, dry fruits, green vegetables
	Sulphur	1. helpful in the growth of hair & nails 2. keeping skin soft and healthy 3. helpful in formation of digestive juices, enzymes, hormones, vitamins, etc. 4. helpful in digestion, absorption and metabolism of proteins	1. physical growth in children disrupts 2. skin becomes dry and dull 3. hair and nail growth disrupts	Chicken, fish, eggs, milk, mil products, cottage cheese, groundnuts, *masur* lentils.

	magnesium	1. helpful in metabolism of calcium and phosphorous 2. helpful in activating enzymes 3. balancing sensation power of vascular system	1. muscle fatigue 2. insensibility 3. painful contraction of muscles of arms-legs 4. feeling depression	Cereals, lentils, oil seeds, dry fruits
	iodine	1. physical growth and development 2. mental development of child 3. reducing cholesterol level 4. milk formation in nursing mother 5. control and regulation of basic metabolism	1. goitre 2. cretinism 3. myxedema	Sea salt, sea fish, sea grass, eggs
	fluorine	1. mineralization of bones 2. for good health of bone fibers 3. for good health of teeth	1. dental fluorosis 2. skeletal fluorosis	Milk, cottage cheese, eggs, potato, sea fish, meat
	copper	1. absorption and metabolism of iron 2. formation of RBCs	1. improper physical development	Liver, meat, lentils, kidney,

		1. normal development of bones 2. formation of enzymes 3. formation of melanin	1. formation of connective tissues does not take place	Roots vegetables, dry fruits
	zinc	1. in wound healing 2. development of bones 3. development of brain 4. helpful in normal growth 5. development of reproductive organs	1. delayed wound healing 2. normal growth and development is disrupted 3. hair loss 4. wounds on skin	Herrings and oyster, meat, eggs, wheat bran, oat flour, lentils, dry fruits
	manganese	1. physical growth and development 2. in reproductive functions 3. secretion of hormones 4. helpful in metabolism 5. for good health of liver	1. reproductive organs do not develop fully 2. deposition of fats in liver 3. development in animals is disrupted	Wheat bran, maize bran, groundnut, dry peas, blackberry, tea, coffee, dry fruits.

IMPORTANT POINTS:

1. The word 'vitamin' was given by Casimir Funk in 1912.
2. Vitamin A is of 4 types— retinol, aldehyde, retinoic acid, vitamin A_2
3. Vitamin A plays an important role in physical growth and development.
4. Vitamin A is mainly found in carrots, mint, spinach, amaranthus leaves.

5. Due to deficiency of vitamin D in body, alkaline phosphatase increases in blood.
6. Vitamin K mainly helps in blood clotting.
7. Deficiency of vitamin C causes scurvy.
8. Riboflavin regulates and controls hormones.
9. Deficiency of calcium weakens bones and growth recedes.
10. In a normal person, 4-5 grams of iron is present.

EXERCISE:

1. Choose the correct option:

(i) Which disease is caused by deficiency of iodine?

(a) Goitre (b) Rickets

(c) Night blindness (d) Fluorosis

(ii) How much iron is present in the body of a normal person?

(a) 5-6 grams (b) 4-5 grams

(c) 3-4 grams (d) 6-7 grams

(iii) Which is severe symptom of pellagra disease?

(a) Skin disease (b) diarrhea

(c) Dementia (d) none of these

(iv) Which disease is caused by deficiency of thiamine?

(a) Beriberi (b) night blindness

(c) Anemia (d) pellagra

2. Fill in the blanks:

(i) Vitamin K is necessary for ————

(ii) Keratomalacia is caused by the deficiency of ————-

(iii) Bone softness is also known as ————-

(iv) Excess of fluorine causes ——— disease.

3. How many types of vitamin exist? Explain.
4. What is the importance of folic acid in food?
5. Explain functions of vitamin A.
6. Write the effects of deficiency of thiamine in body.
7. Explain functions and effects of deficiency of iron.
8. What are the effects of deficiency of niacin?

ANSWERS:

1. (i) a (ii) b (iii) c (iv) a
2. (i) blood clotting (ii) vitamin A

   (iii) rickets (iv) fluorosis

CHAPTER : 15
BALANCED DIET AND FOOD GROUPS

The human body constantly requires nutritive elements and these nutritive elements are important for maintaining our health. That is why it is important to take these elements in our daily diet. And this is possible only if we eat a balanced daily diet.

Balanced diet– A diet that contains proper proportions of carbohydrates, fats, proteins, vitamins, minerals, and water, according to a person's age and gender. To maintain good health its essential to eat a balanced diet.

Table 15.1 shows the proper proportions of nutritive elements to be incorporated in a balanced diet (man and woman adult)

Table 15.1

	Adult man (in grams)	**Adult woman (in grams)**
Cereals	400	300
Lentils	70	60
Green leafy vegetables	100	125
Other vegetables	75	75
Root vegetables	75	50
Fruits	30	30
Milk	200	200
Fat	35	30
Sugar or jaggery	30	30

Source: NIN (1985)

The food article given in the above table are in raw state. Nutritive elements are present in different types of food items. No single food item contains all the nutritive elements. Therefore, we should include different types of food items in our diet.

Food groups— on the basis of their nutritive elements food is mainly divided into 11 types. For example: (i) cereals and millets, (ii) pulses, (iii) nuts and oil seeds, (iv) vegetables, (v) fruits, (vi) milk and milk products, (vii) eggs, (viii) meat and fish, (ix) oil and ghee, (x) sugar and carbohydrates, (xi) spices

To obtain a balanced diet, it is very essential to include these 11 groups in our daily diet. Difficulties arise in remembering these 11 groups. These difficulties did not make it possible to add all 11 food groups in the diet. The Indian Council of Medical Research (1989) classified these 11 food groups into 5 groups on the basis of nutritive elements present in them. (Table 15.2)

Table 15.2

11 groups		5 groups	
1	Milk and Milk products	1	Milk and Milk products
2	Meat, Fish, Chicken, etc	2	Protein- providing foods
3	Eggs	3	Cereals
4	Pulses, Beans, Oil seeds	4	Fruits and Vegetables
5	Cereals	5	Fats and Sugars
6	Potato, SweetPpotato, other root vegetables		
7	Sour fruits		
8	Green leafy vegetables, Yellow vegetables and		
9	other Fruits and Vegetables		
10	Oil, Ghee, Butter		
11	Jaggery, Sugar, etc.		

Table : 15.3 (Five basic food groups)

Food group		Food products	main nutrients obtained	Physical functions
1	**Body building foods**			
(a)	milk and Milk products	Milk, curd, buttermilk, cottage cheese, milk powder ice cream, etc.	This food group is a good source of calcium, phosphorous, riboflavin, vitamin D, vitamin A, fat, protein. That is why it is known as complete nutritional food.	Growth and development of body, formation of bones and teeth, regulation of physical activities
(b)	Meat, Fish and Eggs	Mutton chicken, Fish and Eggs	Proteins, iron, fat, fat-soluble vitamins and other micro-nutrients.	Growth and development of body, formation of haemoglobin, providing energy
(c)	Pulses, nuts and oilseeds	Brown chickpeas, green gram, red lentil, split red gram, other beans, nuts like almonds, walnut, cashew nuts, coconut, pistachio, etc. oilseeds such as sesame, groundnuts, soya bean, mustard oil, etc.	Protein, fats, fibers, essential fatty acids, vitamin B group, mineral salts, etc.	Growth and development of body, energy providing, regulation of physical activities

2	**Protection-providing food group- fruits and vegetables**			
(a)	yellow fruits and vegetables, green leafy vegetables	Yellow fruits and vegetables, green leafy vegetables	Δ carotene, various mineral salts, water and fibers	Regulation of physical activities, protection against diseases like night blindness, anemia, etc.
(b)	Group of sour fruits	All sour fruits- gooseberry, Amla, oranges, lemon, guava, tomato, etc.	Mainly vitamin C and other mineral salts	For good health of gums, teeth and bones, regulation of physical activities
3	**Other vegetables, fruits and root vegetables**	Potato, beetroot, eggplant, onion, sweet potato, fruits like banana, grapes, apples, water melon, etc	Main source of mineral salts, water and fiber	Energy giving foods
4	**Cereals and millets**	Wheat, maize, millets, barley, rice, oat, etc	Carbohydrates, protein, vitamin B group, calcium, phosphorous, and iron	Energy giving food, regulation of physical activities, etc
5	**Fats and Sugars**	Ghee, oil, butter, sugar, jaggery, honey, toffee, syrup, etc	Fats, essential fatty acids, carbohydrate	Mainly energy giving

Different food groups, their nutritive elements, sources and functions are briefly given in table 15.3. But it should be kept in mind that each food item provides only some nutritive element Therefore, all the food groups should be included in our daily diet.

The main nutritive elements provided by these food groups are as following—

1. Body-building food groups (pulses, milk, meat, and fish)

Food items belonging to this group are mainly rich in protein. Protein repairs the damages in the body. This food group also provides vitamin B such as thiamine, riboflavin and niacin. Eggs, milk and liver are good sources of calcium and iron. One serving of this food group provides 5-6 grams of protein.

Following points should be kept in mind while choosing food from this food group–

(i) All the lentils, beans are included in the pulses group. For example, Brown chickpeas, green gram, red lentil, split red gram, peas, other whole pulses. Incomplete proteins are obtained from these sources which become complete when taken in combination with wheat and milk products. Eating rice and pulses together, kedgeree or khichdi is good source of protein. Soya bean has maximum 42% protein.

(ii) Proteins and fats are obtained from oil seeds which are sources of fatty acids and energy.

(iii) Milk and milk products– this food group is mainly present in milk and its products. Like–

buttermilk, curd, cottage cheese, dry milk etc. all the food items of this food group are sources of calcium, phosphorous,, vitamin B (riboflavin), and protein. The protein obtained from milk is of complete type and it is the best quality protein because it contains all essential amino acids in sufficient quantity. This is the reason why milk is considered complete food for children. Curd prepared using useful bacteria is also a good source of protein and is easly digestible than milk. Cottage cheese is also prepared from milk and is a source of protein and fat. A normal person should consume 500 ml milk everyday or milk products of the same quantity.

(iv) Eggs, meat, fish, chicken, liver are animal-based food items. Protein obtained from them is complete protein and it is the best quality protein. These are main sources of vitamin B12 which is not found in plant-based food items.

2. **Immunity-providing food group (fruits and vegetables) —** this food group is divided into 4 parts–

(i) Green leafy vegetables (spinach, mustard, fenugreek), yellow fruits (papaya, mango) and yellow vegetables (pumpkin, carrot). β carotene is predominantly found in these food items which get converted into vitamin A in our body. These vegetables are good sources of calcium, iron, riboflavin, folic acids, and fibers.

(ii) Sour fruits– (gooseberry, lemon, orange, guava), drumstick, tomato, cabbage are included in this category. Sour fruits are main sources of vitamin C.

(iii) Bulbous and roots– in this group potato, sweet potato, taro root are included. This group is a good source of carbohydrate and energy.

(iv) Other fruits and vegetables– all the fruits and vegetables which are not included in the other 3 groups are included in this group. For example, eggplant, ladyfinger, bottle gourd, banana, apple, pear, etc. vitamin B group, mineral salts and water are obtained from this group.

All the aforementioned fruits and vegetables are good sources of vitamin, mineral salts and water and perform the function of regulation and control of physical activities and provide protection against diseases. Seasonal fruits and vegetables should be included in our daily diet. At least 300-400 grams of fruits and vegetables should be consumed daily.

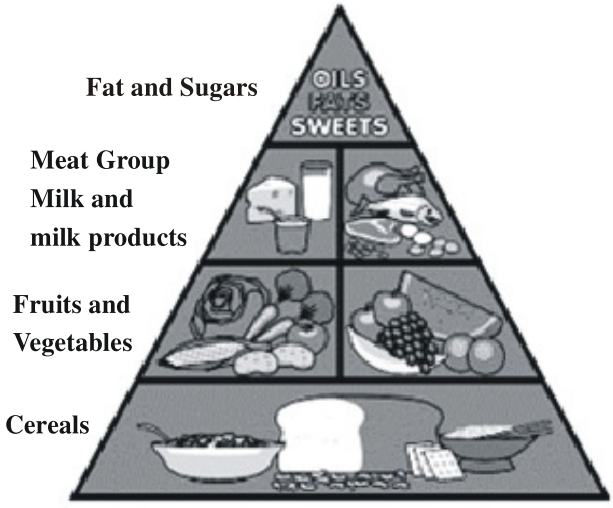


Figure : 15.1 Basic five food group

Cereals— this food group provides carbohydrates, protein and energy. Cereals like wheat, rice, maize, sorghum, millet, etc are included in this food group. In addition to carbohydrates, this group is also a good source of vitamin B group, some mineral salts like calcium, phosphorous, iron and fibers. 6-12% protein is present in cereals. A normal person should consume 300-400 grams cereals daily. Amino acids are lacking in this group and so the protein obtained is an incomplete protein. This is the reason why cereals should be taken in combination with pulses and milk. Cereals contain less amount of fat but that much fat is also important for body. The fat in cereals

contains fatty acids which are required by the body. Cereals provide energy to the body regulates and controls physical activities and are important for physical growth and development.

Fat and sugars— this group mainly provides energy. That is why it is known as 'fuel group'. Sugar and jaggery give instant energy whereas oil and fat are in saturated state and remain stored in our body. Sugar and jaggery provide sweetness to the food and about 25% of these should be used daily.

Fats and carbohydrates obtained from oil, ghee and butter provide energy to our body. An adult should take 20 grams fat everyday'. Excess of fat gets deposited in our body which leads to obesity and other diseases.

IMPORTANT POINTS

1. Food substances are divided into 5 types on the basis of nutritive elements present in them.
2. Milk and milk products performs the function of formation of bones and teeth and physical growth and development.
3. Protein mainly helps in physical growth and development and repairs damages to the body.
4. The main function of fruits and vegetables is regulation and control of physical activities and protection against diseases.
5. Wheat, rice, maize, barley, millets provide energy to the body.
6. Oil, ghee, butter, jaggery, sugar, honey are included in fat and sugar group and they provide only energy to the body.
7. A normal person needs 300-400 grams of cereals and 300-400 grams fruits and vegetables every day.
8. Sour fruits and vegetables contain vitamin C predominantly.
9. Protein found in milk is complete and of the best quality.
10. Proposed dietary intake are denoted quantities of nutritive elements obtained from food that fulfils the nutrition requirements of people belonging to a particular community.

EXERCISE:

1. Choose the correct option:

(i) Fats and sugar mainly provide
(a) Protein (b) Energy
(c) Vitamin (d) Mineral salts

(ii) Protective foods are
(a) Fruits and vegetables (b) Cereals
(c) Pulses (d) all of these

(iii) Milk and milk products mainly contain
(a) Vitamin C (b) Thiamine
(c) Calcium (d) Iron

(iv) How much pulses (in grams) should an adult man and woman take daily?
(a) 50-60 (b) 60-70
(c) 70-80 (d) 40-50

2. Fill in the blanks:

(i) β carotene converts into ------ in the human body.

(ii) A normal person should take ------- of cereals every day.

(iii) ---------- is mainly found in sour fruits and vegetables.

(iv) Animal based foods are rich sources of -----

(v) ------- of fats and ----- of sugar should be consumed daily.

3. What is a balanced diet? Write the classification of food on the basis of nutritive elements.
4. Make a table and classify five basic food groups.
5. Explain body-building foods.
6. Explain classification of protective foods.

ANSWERS:

1. (i) b (ii) a (iii) c (iv) b
2. (i) vitamin A, (ii) 300-400 grams, (iii) vitamin C (iv) Protein, (v) 25 gram, 30 grams

CHAPTER : 16

PREPARATION OF FOOD AND INCREASING FOOD NUTRITION

Cooking of food has been going on since ancient times. Even in the modern age the process of cooking food has been undergoing changes and is being modified. There are various methods of cooking food but in the present times while cooking food care is taken that food remains tasty, full of nutrition and even attractive.

Advantages of activities—

1. Food items which are solid and firm become soft and digestible on cooking. They can be easily chewed and eaten so that digestive juices can easily perform action and digestion of food becomes easier.
2. Taste and aroma of food increases on cooking. Natural aroma of some food gets lost on cooking. Such as fish loses its unattractive smell on cooking and becomes palatable. On the contrary aroma of good rice gets doubled on cooking.
3. Cooking changes food items into many forms. Like chapattis, bread, biscuit from wheat flour.
4. While cooking, temperature destroys harmful bacteria present in the food and makes food safe. Food free from bacteria has no chances of causing illness.

Methods of cooking food–

Food can be cooked in many ways– bread and biscuit is baked, some foods are fried in hot oil. In these methods of cooking varying temperature is required one way or the other. On the basis of cooking medium, cooking methods can be classified into following types–

1. By moisture- boiling, simmering, stewing, cooking by pressure and steam
2. By hot air- baking, roasting
3. By greasing- frying, deep frying, sautéing

By moisture—

1. **Boiling –** this is the most popular and simple method. The amount of water taken in this method should be such that the food gets completely immersed in it. Thereafter, water is set for boiling at 100^0C. At this temperature, bubbles on water surface are formed and burst continuously. Pulses, rice, potato and other vegetables are cooked by this method.
2. **Simmering–** this method is the same as boiling. Difference is of temperature only. The temperature of water is maintained at around 85^0C. The bubbles formed in the water burst before they reach the water surface. Because of low temperature this method takes more time. Curry, *kheer* etc are prepared using this method.
3. **Stewing–** in this method, food item is cooked with very little water at a low flame in a covered pot. This method takes a lot more

time but food cooked is soft, digestible and tasty. For example, meat, vegetable stew is prepared using this method.

Steaming— water gets transformed into steam on boiling and food is cooked using this steam. Food is cooked by two ways using this steam.

(a) Direct method– in this method, water is boiled in a pot. When water starts boiling then raw food is placed in a sieved pot and is placed on a raised platform kept in the pot. Cooking takes place in a covered pot. Idli, *Dhokla* are prepared by this method. In this method heat is generated within the product itself.

(b) Indirect method– In this method, food does not come in direct contact with the flame. The indirect (or conventional) methods are those in which heat is generated externally to the product and is then transferred to it through its external surface by conduction, by convection or by radiation. Pudding is prepared using this method.

4. **Pressure cooking–** in this method food is cooked at pressure above the atmospheric pressure. The water boils above 100^0 and as the pot is covered steam cannot escape and thus, food is prepared quickly. By this method, potatoes are boiled in 10-12 minutes, rice in 6-8 minutes and white chickpeas in about 30 minutes.

2. By hot air—

1. **Direct roasting–** in this method food is cooked directly in contact with fire. While roasting food is continuously swirled and mixed so that heating is homogeneous. Example- roasting potato, sweet potato, corn, meat, etc.
2. **Indirect roasting–** in this method food does not come in direct contact with fire. Preparing bread on a pan, roasting of groundnuts, brown chickpeas in hot sand are some examples of this method.
3. **Baking–** for cooking food in this method, oven or clay oven is used. These ovens are provided with lids so that the hot air remains inside and cooks food. Cake, biscuits, bread, etc. can be prepared by this method.

3. By greasing—

Cooking by greasing is one of the famous methods of cooking because when food comes in contact with some kind of grease, its taste enhances and cooks readily. Depending on the amount of oil or ghee used for cooking, there are following methods of cooking:

1. **Shallow oil frying–** in this method, food is fried in shallow pots such as pans, frying pan, etc, in minimum oil and at low flame. Oil and ghee is used so that food does not stick on pot's surface. Cutlets, dosa, *paranthas* are cooked by this method.
2. **Deep oil frying–** this method is also known as French method. Oil or ghee is used in sufficient quantities so that the food completely dips in it. Dumplings, rissole, etc are prepared by this method.
3. **Sautéing–** in this method, food is cooked in very low amount of ghee or oil at low flame. Food is continuously tossed so that the entire ghee or oil used gets absorbed. A little more ghee can be used if food remains hard. Many vegetables are cooked by this method.

Increasing food nutrition

Nutrition of food depends on the nutritive elements in it. Wheat is a good source of carbohydrates pulses for protein, fruits or vegetables for vitamins and minerals. But the amount, quality and availabe nutritive elements get affected once the food gets cooked. Therefore, careshould betaken that these nutritive elements are not destroyed while cooking. Following points must be kept in mind—

1. Fresh fruits and vegetables should be used.

Food items which can be eaten raw should not be cooked so that maximum vitamin-minerals are retained. Example tomatoes, carrots, radish, cucumber, onions, etc.

2. Remove peels of vegetables as thin as possible otherwise vitamins and minerals present in peels will be lost.
3. Cut big pieces of vegetables so that the exposed area of vegetables is considerably large and nutritive elements are destroyed less.
4. Cook the vegetables in a covered pot in minimum quantity of water so that nutritive elements remain preserved againt steam. If water in the vegetables is in excess, use that same water for pulses, or make a soup of it.
5. Do not rub rice and pulses while washing them in water. Water-soluble vitamins may get destroyed.
6. Do not throw away starch of rice, it contains many nutritive elements.
7. Use whole grain wheat and pulses with peels in food. These contain vitamin B group, mineral salts and fibers in large quantity.
8. Do not stir food continuously while cooking it. By stirring, large part of food comes in contact with air which damages vitamin C by oxidation.
9. Cook protein-rich foods- eggs, meat, fish at low flame. At high flame, protein present in them becomes stiff and cannot be digested easily.
10. Cooking in pressure cooker preserves nutritive elements and saves time and fuel.
11. Nutritive elements in food can be increased in many ways- mixing of food items, germination, fermentation and fortification- increases the nutritve value of food.

1. Combination of food items–

All the food items do not contain nutritive elements in the same quantity. Some contain more while some have fewer elements. If we consume same or particular food item for a long time, our body may become deficient of other of element that we were not consuming for a long time & we may also see its effects. For example, consuming rice for a long time shows symptoms of beriberi. Therefore, we should mix foods to avoid any instances of disease. If we mix a food item having excess of one nutritive element like carbohydrates in wheat with a food item having less of that particular nutritive element, it increases quality and quantity of nutrition in our food. If we consume only wheat or only pulses then we will only have incomplete protein in our diet but if we consume them together we will have complete protein in our diet. In the same manner we can increase nutrition in our diet by eating wheat with milk or milk products with vegetables.

2. Germination–

Germination of whole wheat and pulses increases their nutrition multiple times. For this keep wheat grains and pulses soaked in water overnight and then keep the soaked grains tied in a wet cloth. In summers, these grains germinate in a day and in winters they take three days. In this germination process, some vitamin C and B are synthesized in seeds. In addition some anti-nutritional factors are destroyed and protein and iron availability increases.

3. Fermentation–

The required molecular organisms for fermentation are present only in sugar-rich food items. In this process, these microorganisms breakdown carbohydrates into alcohol and carbon dioxide in the presence of heat and moisture. Because of this a spongy texture is developed in the food item.

$$C_6H_{12}O_6 \longrightarrow \text{anaerobic} \longrightarrow C_2H_5OH + CO_2$$

Starch ethyl alcohol carbon dioxide

Vitamin B group is synthesized in good amount during fermentation. The anti-nutritional factor gets destroyed and the protein- iron gets increased. The food becomes light and digestible. Idli, dosa, *dhokla*, bread, etc are prepared by this method.

4. Fortification–

Fortification is the practice of deliberately increasing the content of an essential micronutrient, i.e. vitamins and minerals (including trace elements) in a food irrespective of whether the nutrients were originally in the food before processing or not, so as to improve the nutritional quality of the food supply and to provide a public health benefit with minimal risk to health. For example, deficiency of iodine in water and soil of Rajasthan led to the consumption of iodine-rich salt in the state so that the deficiency of iodine can be made good. In the same way, addition of vitamin A and D in vegetable ghee can prevent many diseases. Nutrition level of food cannot be increased by fortification at home.

5. Parboiling–

Sometimes raw rice or paddy is dehusked by using steam. This steam also partially boils the rice while dehusking. During this cooking, protein and vitamin B group gets attached with starch of rice. Thus, availability of protein and vitamin B increases in rice and rice becomes more nutritious.

In this way we can increase nutrition and quality of various foods by various methods.

IMPORTANT POINTS:

1. Food becomes soft and easily digestible on cooking.
2. The taste and aroma of food increases on cooking and also food takes different forms on cooking.
3. The nutrition of food depends on the nutritive elements present in food.
4. Care should be taken while cooking food so that nutritive elements are not destroyed.
5. Pulses and vegetables should be cooked only in covered pot and according to requirements. Cooking in pressure cooker requires less time and efforts and also maintains nutrition of food.
6. Nutrition in food can be increased by mixing foods, germination, fermentation, parboiling, fortification, etc.

EXERCISE:

1. Choose the correct option—

(i) Which of the following is not a method of cooking by moisture?

(a) Boiling (b) Simmering
(c) Frying (d) Cooking by steam

(ii) The temperature of water during simmering is

(a) 50^0C (b) 30^0C
(c) 100^0C (d) 85^0C

(iii) Germination increases ———— in food

(a) Protein (b) vitamin C
(c) Calcium (d) Iron

(iv) Which gas is released during fermentation?

(a) Carbon dioxide (b) Oxygen
(c) Nitrogen (d) Methane

2. Why do we cook food?
3. What do you mean by fortification and parboiling?
4. What is sautéing?
5. Write in detail the different methods to increase food nutrition.
6. Explain different methods of cooking with examples.

ANSWERS:

(i) c, (ii) d, (iii) b, (iv) a

CHAPTER : 17

FOOD PRESERVATION

Our country faces the problem of less food and low nutrition, at the same time food also gets wasted in some parts. This from a physical, moral and social view is an unforgiveable crime. Food is our basic necessity. Food or a balanced diet is necessary to keep body healthy and fit. Preserving food means keeping food free from bacteria, viruses and to provide energy, strength to the body for performing daily physical and mental activities. That is why it is very important to preserve food.

Sometimes the food is balanced but if proper care is not taken in choosing, cooking and preserving of food, it may get infected with microorganisms and its consumption may cause diseases. All food items are not grown in all seasons. For example, pulses, oilseeds, wheat is grown in Rabi season while other cereals are grown in Kharif season. Therefore these foods should be preserved so that they can be consumed all the year round.

Food preservation— food preservation is the process of treating and preserving food from getting rot as well increasing the quality and nutritive value of food. Some micro-organism reduce the quality and nutrition of food but some other help to preserve food and also add some special qualities to food- like yeast.

To increase the nutritive value and taste of food, it is necessary to preserve food.

Food preservation involves preventing the growth of bacteria, fungi (such as yeasts), or other micro-organisms (although some methods work by introducing benign bacteria or fungi to the food), as well as slowing the oxidation of fats that cause rancidity.

Food can be divided into 3 types—

1. **Perishable food–** Perishable food like milk, curd, meat, fish, green leafy vegetables (spinach, fenugreek, coriander) etc. gets spoiled easily when at room temperature. This is because they have large quantities of water. Therefore, we can cool the boiled milk and refrigerate it to increase its life.
2. **Semi-perishable food–** Semi perishable foods have less water compared to perishable foods. Ex- potato, cabbage, onion, taro root, etc. these can be preserved for a period of 7 to 15 days.
3. **Non-perishable food–** These foods have very little quantity of water and their life is of 1-2 years. Ex- wheat, rice, millets, maize, pulses, etc.

Factors responsible for spoiling food—

1. **Self- spoiling of food–** Because of the enzymes present in the food, the food automatically gets spoiled. For example, the

enzymes present in fruits and vegetables spoil them. When fruits get ripened then also the enzymes remain activated and therefore more ripened fruits get spoiled.

2. **Biochemical changes–** In food items like fresh fruits and vegetables many changes occur even at room temperature. Biochemical changes inside the food items is responsible for these changes. For example if fruits and vegetables are over-ripened, they start giving an unpleasant odour and many fruits and vegetables show changes in colour and taste when they are kept sliced or cut.

3. **Spoiling of food because of insects and birds–** Insects, birds harm food. These insects and birds spoil dry fruits, sesame, seeds, and cereals more than they eat. They lay the eggs on food items, defecate on them or leave their hair on them thus making food poisonous.

4. **By micro-organisms–** The micro-organisms responsible for poisoning of foods are–

1. Fungus/molds
2. Bacteria
3. Virus
4. Yeast

These micro-organisms enter food and then grow rapidly inside them and use the nutritive elements of food for their own growth. Micro-organisms are small unicellular or multicellular organisms that we cannot see but can identify them through a microscope. These micro-organisms make food toxic and the person consuming them can fall ill.

The micro-organism especially responsible for spoiling cereals is fungus or molds. Temperature of food items increase because of fungus and food smells awful. The nutrition and taste of food reduces. Micro-organisms can be divided into 3 types on the basis of their requirement of oxygen– aerobic, anaerobic and optional anaerobic organisms. In the same way, on the basis of heat resistance capacity organisms are mesophilic and thermophilic.

The main points to identify spoiled food are–

1. Change in color and taste.
2. Reduction in aroma and nutrition
3. Development of cotton like fungus on food items like bread, pickle, etc.

Therefore, by identifying spoiled and poisoned food we must avoid eating them so that our body remains disease free and we stay healthy and fit.

Principles of food preservation—

1. By preventing food from getting self-spoiled– Sometimes food gets spoiled due to presence of organic catalysts or oxidation of free fatty acids in food. These can be prevented by two ways:

(a) Deactivation of organic catalysts

(b) Prevention of chemical reactions in food

2. By preventing growth or activity of micro-organisms in food

(a) Using preservatives

(b) Using high temperature

3. By preventing physical or mechanical damage
4. By preventing foods from attacks of mice, insects, wasps, birds.

Methods of preservation—

Micro-organisms reduce or change taste, colour, aroma and nutrition of foods. Because of this food no longer remains healthy and instead becomes toxic and harmful. To keep food healthy and nutritious

for a long time food preservation techniques are used. These methods increase shelf-life of foods enabling it to be consumed even in off-season.

In food preservation methods, growth of micro-organisms like bacteria, fungus and other organisms is controlled. In addition, helps in reducing factors which are responsible for bad smells in food and for oxidation of fats in food. The methods of food preservation are—

1. High hydrostatic pressure, vegetable bacteria, pressurized deactivation of yeast or molds
2. Killing micro-organisms or boiling for element radiation

For preservation, food is boiled in water at very high temperature (100^0C) for 1-2 minutes so that all the germs, bacteria present in food get destroyed. Even the spores of organisms are destroyed and the life of food increases.

Fruits and vegetables are boiled at high temperatures for 1-3 minutes before they are preserved. After boiling they are immediately cooled which is known as blanching.

3. **Drying or dehydration–** This is the oldest method of preserving foods in which the activity of water is considerably reduced and bacteria stops growing in food.

   Two main methods of dehydration are–

(a) Natural drying (drying in sun, dehydration at an industrial level)

(b) Artificial drying (drying by solar dryer)

4. **Low temperature deactivation (refrigeration) –** Refrigeration is a common and most used method at industrial and domestic level. Both moisture and heat present in food spoils food because micro-organisms grow in high temperature and in the presence of moisture. If we remove moisture from food then food can be preserved for long. But there are some foods in which moisture has to be maintained such as milk, curd, fruits, eggs and vegetables.

To preserve fruits, green leafy vegetables, meat, fish, eggs, milk, curd. Cottage cheese, etc. at home refrigerator is used. Cold storages, chill storages are used at industrial levels. The temperature in this method is maintained at 4^0 C – 10^0 C.

5. **Vacuum packing–** Food items should be stored in air-tight bags or bottles. Vacuum packing reduce the air required for bacterial growth so that the bacteria cannot grow or survive in such an environment. Vacuum packing is mostly used in storage of nuts.
6. **Preservation using salt–** Salt binds the moisture present in foods. That is why free moisture is not available in food for bacteria to grow. To maintain the concentration of food the fluids move out from bacterial body into the food. This process is known as osmosis.
7. **Preservation using sugar–** Sugar is used for preserving fruits. If we mix sugar in fruits and vegetables then the sugar destroys activity of micro-organisms by osmosis and food remains preserved for a long time. Ex- jam, jellies, marmalade, sauce, etc
8. **Preservation by pickling–** Pickling is the process of preserving or expanding the lifespan of food by either anaerobic fermentation in brine or immersion in vinegar. The resulting food is called a pickle. The preserving agents in pickles are– vinegar, sodium benzoate, etc. They increase the shelf-life of food.
9. **Potting–** One of the ways of preserving meat

is putting meat in a pot and sealing its cover with a layer of fats.

10. **Jugging–** Jugging is the process of stewing whole animals, mainly game or fish, for an extended period in a tightly covered container such as a casserole or an earthenware jug.

IMPORTANT POINTS:

1. On the basis of time required by food for getting soiled, foods are perishable, semi-perishable and non-perishable.
2. If the color, taste, aroma, structure, nutrition of food changes, it is a spoiled food.
3. Preservation is preventing food from action of micro-organisms, fungus, and virus for a long time.
4. Preservation increase shelf-life of foods and then they can be consumed even in off-season.
5. Food can be preserved by chemical preservative or many preservatives present in our kitchen– sugar, salt, vinegar.
6. Food can be preserved by drying it in sun or by a solar dryer.
7. Different methods of preservation are– dehydration, refrigeration, boiling, vacuum packing.

EXERCISE:

1. Choose the correct option–

(i) Which is a semi-perishable food?

(a) Milk (b) Cereals

(c) Potato (d) Pulses

(ii) What is the required temperature in refrigeration method?

(a) $4^0 - 10^0$ C (b) $15^0 - 20^0$ C

(c) $20^0 - 25^0$ C (d) $1^0 - 4^0$ C

(iii) The organisms which poison food are

(a) Bacteria (b) Viruses

(c) Yeast (d) All the above

(iv) The temperature required for preservation at very high temperatures is

(a) 100^0 C (b) $100^0 - 150^0$ C

(c) $100^0 - 170^0$ C (d) 200^0 C

2. Fill in the blanks–

(i) The main methods of dehydration are ——— — and ————-

(ii) The colour of a sliced apple changes to brown due to ——————— changes.

(iii) The unwanted change in colour, shape, and aroma is known as ———————

(iv) Preservation of food in an air-tight bag is known as ———————-

(v) The technique of preserving meat in a pot sealed with fat is called ———————

3. Define blanching.
4. Explain food preservation.
5. Explain process of osmosis.
6. Write in short principles of food preservation.
7. Write in detail various methods of food preservation.

ANSWERS:

1. (i) c (ii) a (iii) d (iv) a
2. (i) natural, artificial (ii) biochemical
   (iii) food spoilage (iv) vacuum packing
   (v) Potting

CHAPTER : 18

COLD BEVERGAES, CONVENIENT AND READY TO EAT (INSTANT) FOODS

Cold beverages are liquids that quench thirst, help in increasing fluids in the body, enhance body nutrition as well as give energy and pleasure.

Cold drinks are mostly used in summers. There is an urge to drink lemon juice, sharbat, fruit juice, buttermilk like chhachh and milkshakes. These drinks provide relief from hot weather and also increase freshness and moisture.

But in this modern world, children prefer carbonated cold drinks and preserved fruit juices more. These cold drinks are as cold as ice and are of different flavors like lemon, orange, mango etc. consuming these cold drinks in hot weather moistens throat and provides energy to a tired body. The effect of the special carbonated cold drinks stays only for a short period of time.

Figure : 18.1 (Cold Drinks)

The ill-effects of carbonated cold-drinks on health–

1. In these drinks only sugar is present as a nutritive element to provide energy. Other nutritive elements like protein, fats, mineral salts, vitamins are absent.
2. Exessive consumption of these drinks imbalances the proportion of calcium and phosphorous in the body which is harmful.
3. Artificial colour and aroma is added in preserved bottled juices for taste and colour which have no nutritional value.

The carbonated cold drinks available in the market are messing with our health in the name of freshness and energy. The messiness of the carbonated drinks surfaced in news when the presence of insecticides was confirmed and these were removed from the market. The quality of water, purity and pakcaging of bottles, quantity of preservative artificial agents for increasing taste and aroma as well as the standard of hygiene followed during their manufacturing are all under scrutiny. Therefore, we must consume home-made cold drinks such as fruit juices, lemon juice, buttermilk, etc. which are not only nutritious and safe but also cheap.

In the changing social environment children have become addicted to alcoholic beverages like beer, wine, etc. These drinks contain alcohol which increases weight and liver gets damaged and digestion, and metabolism gets adversely affected and consumer falls ill.

Convenient and instant foods—

Convenient food is food that is commercially prepared (often through processing) to optimize ease of consumption. Such food is usually ready to eat without further preparation. It may also be easily portable, have a long shelf life, or offer a combination of such convenient traits. Ex- chopped vegetables, bottled fruits and vegetables, batter of idli-dosa, refrigerated peas, chips, etc.

Use of convenient foods saves time and energy. For example, if the instant *pulao* (a dish made with rice) mixture is used then the time otherwise required for washing, soaking rice and washing, peeling, chopping vegetables is saved. The *pulao* mixture can be added to hot boiling water and the dish is ready to eat. The use of convenient food is increasing day by these days because of the following reasons:

1. Increase in the number of working women
2. Increase in the number of nuclear families
3. Less information on culinary skills
4. Physical incapability
5. Old age
6. Lack of time
7. Increased Financial capacity.

Classification of convenient food—

1. **Basic products–** the food items are one or more steps ready before cooking. Ex- peeled garlic, chopped vegetables, etc.
2. **Ready to cook–** these foods are ready to cook, that is all the steps required for cooking are done by the manufacturer. Ex- batter of idli, dosa, etc.
3. **Already cooked food–** these food products are already cooked. Either they have to be heated before consumption or mixed in hot water or they are ready to eat. Ex- soup mixture, baby food, etc.

Ready made products—

The all-ready processed foods can be eaten instantly like biscuits, carbonated cold drinks, bottled fruit juices, etc.

Advantages of convenient foods–

1. Easy and fast to prepare
2. Saving of time and labor
3. More safe than fresh foods
4. Guarantee against spoilage
5. Inclusion of nutritional elements to improve quality
6. Easy to use as and when required

There are some limitations and disadvantages of convenient foods such as nutritional elements get destroyed during processing, excess use of sugar, salt, ghee, oil for increasing taste, use of chemical colour, aroma, preservatives for making food attractive, etc. Also these convenient foods are expensive.

Instant foods or fast foods—

Some convenient foods are instant foods. Because these are prepared instantly they are called instant or fast foods. Ex- pizza, burger, chowmein, sandwich, cake, pastry, etc.

These instant foods are influenced by western culture and are increasingly becoming popular in children and are becoming part of their daily diet.

Figure : 18.2 (Fast Food)

Fast foods are also known as junk foods. Junk means rubbish or scrap. These foods are made up of refined flour or starch and so other nutritional elements and fibers are lacking in them. The amount of calories or energy is excessive especially in cake, pastry, wafers, etc. which increases the level of cholesterol in blood to the of heart ailments. Tomato ketchup, soya sauce, chilli sauce, vinegar used in these foods are made up of chemicals. These invite obesity, high blood pressure, cholesterol in children and consequently children face problems of heart attack and diabetes.

A study in Australia has revlealed that not only junk food is harmful for body but also the brain which affects the decision making power. Stress and depression are collateral effects of junk food.

Thus, we can conclude that not only cold beverages, instant foods mess with our health but being expensive they also affect our budget. We must stay away from them as far as possible.

IMPORTANT POINTS:

1. Cold drinks- lemon juice, fruit juice, buttermilk, and milkshakes- provide relief from hot weather and also increase freshness, provide nutrition, energy and strength.
2. Carbonated cold drinks have no nutritional value.
3. Many of the processes required for convenient foods before cooking are done by the manufacturers.
4. Many convenient foods are a part of instant foods.
5. Consumption of past foods daily increases weight and cause heart ailments (diseases).
6. Pizza, burger, chowmein, wafers, cake, etc. are fast or junk foods. These are prepared instantly but they only provide energy and have no nutritional quality.

EXERCISE:

1. Choose the correct option–

(i) Carbonated drinks are

(a) Nutritious (b) Cheap

(c) Expensive (d) Healthy

(ii) Which of the following is not a junk food?

(a) Sandwich (b) Chowmein

(c) Pizza (d) Lentils-Chapatti

(iii) Which of the following is ready to cook?

(a) Idli batter (b) Germinated cereals

(c) Kurkure (d) Maggi

(iv) Fresh juice is —— in comparison to bottled juice.

(a) Nutritious (b) Moistening

(c) Cheap (d) All of these

2. What is junk or fast food?
3. Define convenient foods.
4. Differentiate between fresh drinks and carbonated drinks.
5. How does instant or fast foods affect our heath? Explain.

ANSWERS:

(i) c (ii) d (iii) a (iv) d

UNIT : IV
CLOTHING AND TEXTILE

CHAPTER : 19

FIBER SCIENCE

Cloth is one the basic requirements for human life. A human being has to use cloth whether he is rich or poor. Cloth is the only thing which stays with a human being at all times. In ancient times man used skin hides, plant leaves to cover his body and protect himself from sun, rain, cold and heat. As the human civilization developed the art of cloth manufacturing also developed. The ancient clothing was different from that of modern times. In hot weather we wear cotton apparel while in cold weather we wear woolen clothes. In rainy season we wear special types of clothes. We wear different clothes also everyday and have different and special clothes for occasions like weddings and festivals. Similarly there are different dresses for different professions like police, fireman, doctor, nurse, and student. It is an old saying that 'clothes make the man' which is true to some extent. Clothes also have a effect on human mind. Wearing clothes according to an occasion boosts confidence and suitable clothes enhance personality. Clothes protect our body and some articles are used in our homes as well such as carpet on floor, curtains and drapery which makes home attractive and beautiful. Even for dusting and bathing different clothe is used. Thus, we can say that clothes have a strong relation with different human activities. Clothes are a symbol of our civilization and culture.

The art of textile manufacturing is continuously developing. Initially all the fibers were provided by nature. In ancient times, to make clothes fibers were obtained from plants and trees and from animal hair. With the development of culture and civilization more and more beautiful textiles have been manufactured. The initial and smallest unit of a cloth is fiber. Without fiber textile manufacturing is not possible. Fiber is a thread like structure whose length is at least 100 times more than its diameter.

Fibers can be classified on the basis of their raw sources and manufacturing process—

Table 19.1 Classification of fibers useful for clothing–

Natural fibers	**Artificial fibers**	**Specialized fibers**
Vegetable–Cotton, linen, jute, hemps	**Man-made–** rayon	Mixed fibers
Animal– wool, silk	**Chemical–** nylon, polyester	
From metals– Asbestos, brocade, gold-silver wires		

I. Natural fibers

A. Vegetable fibers– These fibers are formed from the cellulose obtained from plant cells.

1. Cotton–

This fiber is obtained from the cotton plant. It is the best of all fibers of vegetable origin. Cotton plant grows in summer. Cotton is a soft, fluffy staple fiber that grows in a pod, or protective case, around the seeds of the cotton plants. The pool of cotton is collected and the cotton fiber is manufactured from this cotton pool.

Properties and uses:

Physical properties–

(i) 80-90 % cellulose is present in cotton fiber.

(ii) Microscopically a cotton fiber is a thin and thread like structure.

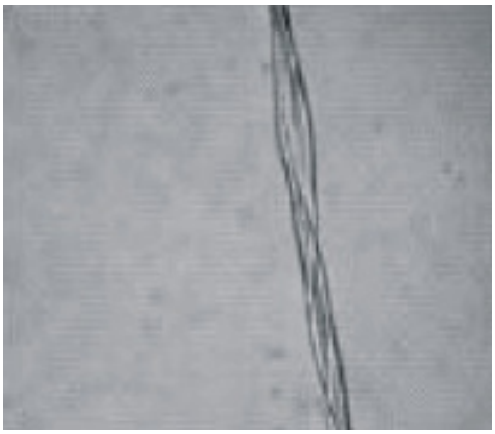


Figure : 19.1 Cotton fiber

(iii) The length of a cotton fiber is two and half inches less than other fibers.

(iv) The surface of cotton fiber is rough and lacks smoothness and shine.

(v) Cotton fiber is very strong and its strength increases when it is wet.

(vi) Cotton fiber lacks elasticity and so cannot be stretched and it shrinks very soon.

(vii) Cotton fiber breaks when pulled strongly.

(viii) Cotton fiber absorbs moisture that is why it is worn in summers. It absorbs sweat and gives cooling effect. Ex- towels, undergarments, etc.

(ix) As the cotton fiber is strong it does not break even on vigorous washing.

Chemical properties–

(i) Cotton fiber gets damaged when dipped in concentrated acid.

(ii) Cotton fiber is not affected by bases. Hence, bases are used for cleaning cotton fibers.

(iii) Bleaching does not affect cotton fibers and so bleach can be used on white cotton clothes.

(iv) Cotton fiber is resistant to even high temperatures but they get damaged and turn yellow when kept under the sun for long time.

(v) Cotton fibers do not take other dyes easily.

(vi) Fungus grows on cotton if cotton is kept in wet, hot and dark place for a long time.

2. Linen–

This fiber is obtained from the stem and stalk of flax plants. When the plant grows fully, it is uprooted and tied and is kept for drying. When the plant dries up seeds and leaves are separated from the stems and the remaining bundle is soaked in water. During soaking, fermentation occurs which destroys gum, pectin, wax present in the stems and the fibers get separated. After this the bundles are dried again. The bark is removed mechanically and fibers are separated. These fibers then undergo combing, Thread from these fibers is prepared which can be used for textile manufacturing.

Figure : 19.2 Linen fiber

Properties and uses:

Physical properties–

(i) 70% cellulose and 30% pectin, water and other impurities are present in linen.

(ii) Microscopically linen fiber is cylindrical and has nodes.

(iii) Linen fiber is the longest natural fiber after silk.

(iv) Linen has low tensile strength and so it breaks on stretching.

(v) Linen fiber is less flexible and so linen clothes get wrinkles.

(vi) Linen is a good conductor of heat. It absorbs body heat during summers and cools the body down.

(vii) Linen absorbs moisture and thus the towels and clothes made from linen are good to use.

(viii) Linen fiber is soft and shiny and it does not catch dust easily.

(ix) Linen gets strong when wet, it can be washed easily.

(x) Germs and bacteria do not grow on linen easily.

(xi) Linen fibers are not affected by light and sun but they get damaged when exposed to light and sun for longer time. Towels, bed sheets and table covers are made from linen.

Chemical properties–

(i) Linen fiber gets destroyed in concentrated acid.

(ii) Bases do not affect linen. But linen turns yellow when strong basic soaps are used persistiully.

(iii) Linen cannot be dyed because of hard surface.

(iv) Bleaching damages linen. Only home-made bleaching agents must be used.

(v) Linen absorbs sweat readily but then it should be washed soon because sweat is acidic in nature.

3. Jute–

Jute fibers are obtained from jute plant. In India, after cotton this is the most used fiber. The stem of the jute plant is separated and is soaked in water so that the bark gets dissolved and the jute fibers get separated. Jute fibers are smooth and shiny but are brittle in nature. Therefore shiny but stiff and rough fibers are formed from jute. That is why apparels cannot be made from jute fibers. They are used for making carpets, cords, sacks and sackcloth. Mainly jute is used in making sacks and for other packing purposes because they are naturally resistant to insects.

4. Hemp–

Hemp fiber is dark brown in color. This fiber is always straight and shiny but is stiff, rough and coarse. Hemp fiber is very strong and long lasting. It is used in making carpets, canvas, cordage, cords, belt, etc. Hemp fibers gets damaged in concentrated and hot bases.

5. Kapok –

Kapok is similar to cotton. But it can not be used for making thread because it is resistant to spin. It is used as an alternative for filling in mattresses, pillows, upholstery, and stuffed toys such as teddy bears, and for insulation. It is resistant to water and is used in airplanes. These fibers are easily dried.

B. Animal fibers

The fibers obtained from animals and insects are called animal fibers. These fibers are made of protein and so are also called protein fibers. Silk is obtained from silkworm while wool is obtained from sheep, goat and camel hair.

1. Silk

The fiber made from silk is beautiful and excellent. That is why silk is known as 'Queen of all fabrics'. Silk fiber is most shining, soft beautiful and

attractive. Silkworms are fed on mulberry leaves. A minute opening is present near the mouth of silkworm. Silkworm secretes saliva from these openings which gets wound around the silkworm's body. When this saliva comes in contact with air, saliva dries up and forms a cocoon. To obtain silk, the cocoon is dropped in hot boiling water. Silkworm is killed and the fiber is wrapped on a reel. Silk fiber was first produced in China.

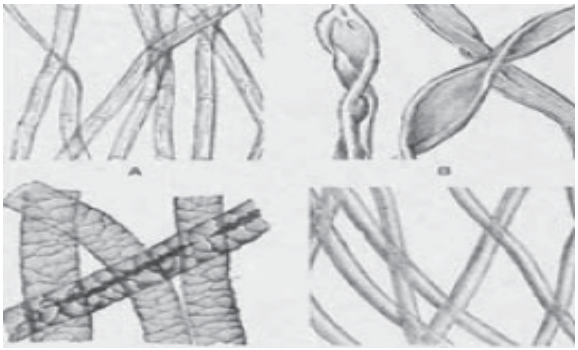


Figure : 19.3 Silk Fiber

Properties and uses–

Physical properties–

(i) 95% of silk fiber is made up of serecin and fibroin protein. Remaining 5% is made of wax, fats and salts.

(ii) Microscopically silk fiber is fine, straight, smooth, shiny, and transparent and rod shaped.

(iii) In between fibers some sticky substances are also seen. These are serecin.

(iv) Of all the natural fibers, silk fibers are the longest. They are called filaments.

(v) Because silk fiber is longest, it is also strongest.

(vi) Because silk fiber is straight and long, they are flexible and elasticity is better. That is why silk clothes are the softest.

(vii) Silk fibers are not affected by stretching and pressures.

(viii) Silk fibers lose up to 20% of their strength when wet and so they should be dry cleaned.

(ix) Silk absorbs water and is comfortable for wearing.

(x) Silk is a bad conductor of heat. So, they should not be worn in summers.

(xi) Silk fibers weaken when dried in sun. Similarly ironing at high temperatures also affects silk.

Chemical properties–

(i) Strong acids damage silk fibers while carbonic acids increase smoothness of fibers.

(ii) Fibers are not affected by mild or weak bases.

(iii) Strong bleacing damages silk. Hydrogen peroxide should be usedfor bleaching.

(iv) Silk fiber is insect-repelling but fungus can grow on wet and packed silk.

(v) Silk fiber can be dyed easily with acidic, basic dyes.

2. Wool

This is natural protein-rich fiber obtained from animals. Mostly wool is obtained from sheep and also from hair of camel, rabbit, deer and goat. To prepare wool, animals are first washed with anti-bacterial solution. Thereafter, wool is sheared from animal skin using machines. This removed wool is known as fleece. This wool removing process is carried in spring season. Wool from a dead animal is removed using some chemical products and the hair are pulled out. Such wool is known as pulled wool.

Wool obtained from different parts of animals is different. Wool is separated according to difference in length, color, shape, flexibility and fineness. The separated wool is immersed in mild basic solution to remove impurities like sweat, wax, etc. if the wool is not cleaned properly in this solution then wool is cleaned using carbonizing process and is dried the presere of

sulphuric acid or hydrochloric acid so that the softness and flexibility of fiber is maintained. Thereafter olive oil is sprayed on wool and fibers are arranged in parallel rows by the process of cording. The fibers are cut accordingly for dyeing and spinning.

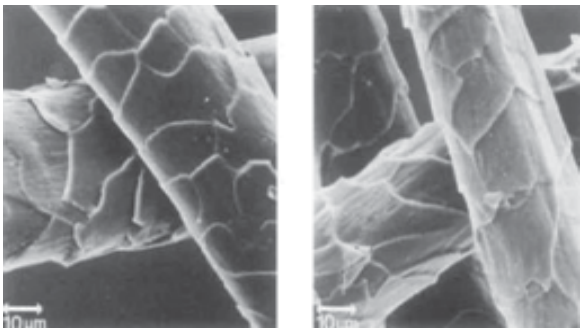


Figure : 19.4 Wool Fibers

Properties and uses–

Physical properties–

(i) Wool fiber is mainly made of keratin protein.

(ii) Sulphur is present in wool fiber.

(iii) Microscopically wool fiber is multicellular, criss-crossed with sharp ends and is round in the middle.

(iv) The softness, colour and shine of wool fiber depend on the body part of the animal from which it is removed.

(v) Wool fiber is the weakest natural fiber. The strength of wool fiber reduces up to 25% when wet. Thus woolen fiber should not be washed vigorously.

(vi) In the presence of moisture, heat and pressure woolen fibers stretch out and separate and get back to original position.

(vii) Woolen fibers are elastic in nature. That is why they are reformed when stretched and they do not get wrinkled.

(viii) Woolen fiber cannot tolerate dry heat. A soft cloth should be placed on woolens before ironing.

(ix) Woolen cloths absorb water.

(x) Woolen fiber does not catch fire easily. That is why woolen blankets are used to put out fire.

(xi) Small woolen fibers are used to make clothing.

(xii) Because protein is present in woolen fibers air gets trapped in vacant spaces which gets heated due to atmosphere and the warming capacity of woolen increases.

Chemical properties–

(i) Acid solution does not affect woolen fibers.

(ii) Bases turn woolen fibers stiff and yellow.

(iii) Woolen fibers get damaged in strong basic solution. Woolen should be washed in mild liquid soaps.

(iv) Ammonium carbonate and borax are safe on woolen fibers.

(v) Woolen fiber is easily dyed by all types of dyes such as acidic, basic, etc.

(vi) Bleaching powder should not be used on woolen clothes. if necessary mild bleaching agents like hydrogen peroxide should be used.

(vii) Fungus grows on woolen fibers if they are kept in wet places. Insects too damage wool. Therefore woolen should be stored in closed boxes with naphthalene balls or neem leaves. Keeping woolen wrapped in newspaper also protects them.

C. Fibers from metals

There are many minerals present in nature which can be melted, stretched, flattened and twisted to form fibers. Gold, silver, copper can be processed to form fibers. Textile made from metallic fibers are heavy. Washing and keeping them clean is a herculean task. Asbestos is used for making fire-resistant clothes.

II. Artificial fibers–

Artificial fibers are the ones that are not obtained from nature**.** They are manufactured using various chemicals and mechanical methods**.** Artificial fibers are stronger, long lasting than the natural fibers and are washable.

A. Man-made fibers – Rayon

This fiber is also called artificial silk because its shine is similar to that of silk. It is known as man-made fiber because some chemicals and bamboo and wood pulp along with cotton are used in its preparation this fiber. All the ingredients are then dissolved and forced through a spinneret to produce filaments which are chemically solidified, resulting in synthetic fibers of nearly pure cellulose. Rayon is of many types depending on the method and materials used in its preparation – nitro cellulose rayon, viscose rayon, cuprammonium rayon, acetate cellulose rayon, etc.

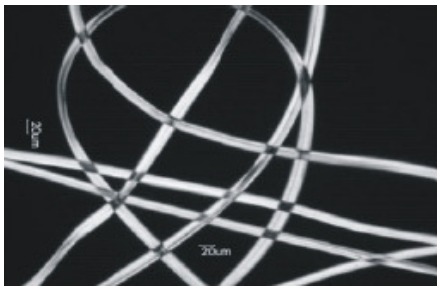


Figure : 19.5 Rayon fiber

Properties and uses–

Physical properties–

(i) Rayon is chiefly made of cellulose whatever may be its method of preparation.

(ii) The microscopic structure of rayon depends on the method of preparation. Ex- viscose rayon is rod like and has thread like stripes on the surface. These stripes shine. Cuprammonium rayon is fine, smooth, and rod-like and shines like silk. Acetate rayon is also rod like but is less shiny.

(iii) Being man made the length of the fiber can be chosen. Long fibers are known as filaments. Beautiful apparels are manufactured from these smooth and soft fibers. Small fibers are known as staples. Clothes with fluffy surface are manufactured from these fibers.

(iv) Rayon fiber is stronger than woolen fiber but less strong than silk fiber. Rayon is stronger when dry. Its strength reduces by 40-70% when wet. Rayon apparels should not be washed vigorously.

(v) Acetate rayon does not absorb water and water remains on it surface only. That is why they dry up so easily. Acetate rayon is thus, used for making curtains, umbrellas, raincoats, etc.

(vi) Cuprammonium rayon is good conductor of heat. This rayon is worn in summers. Clothes made from this rayon are light in weight.

(vii) Viscose rayon can be worn in summer but because its fiber is thick they are heavy in weight.

(viii) Acetate rayon being a bad conductor of heat is used as an undercoat for dresses in summer.

(ix) Rayon fiber melts in the presence of high heat. Steam press gives rayon a distinct shine.

Chemical properties–

(i) Acids have harmful effect on rayon. Fibers get damaged in hot, concentrated and strong acids.

(ii) Rayon can tolerate bases but fibers weaken and lose their shine in solution concentrated bases.

(iii) Rayon can be easily dyed.

(iv) Rayon gets affected by bleaching agents. Hydrogen peroxide can be used with rayon.

(v) Germs and bacteria do not affect rayon. But fungus can grow on wet rayon.

B. Chemical fibers –

1. Nylon–

In these fibers oxygen, hydrogen, nitrogen and carbon are present in fixed ration and composition. To prepare nylon, adipic acid and hexamethylene diamne from coal tar are mixed together and heated in an autoclave in which nylon polymer gets ready. This polymer is poured in cold water and a layer of it is prepared. This is known as flakes. These flakes are melted and are passed through a spinneret. Fibers come out from the holes of spinneret and get dried up on coming in contact with air.

Figure : 19.6 Nylon fiber

Properties and uses–

Physical properties–

(i) Nylon is a synthesized artificial fiber. Microscopically these fibers are cylindrical, smooth, shiny, straight and transparent.

(ii) Nylon fiber is a strong fiber. It does not break on rubbing, twisting and folding. Sharp scissors is required to cut the nylon fiber.

(iii) Nylon clothes do not absorb water and so they get dried up easily. They are not suitable in summers.

(iv) Nylon is a bad conductor of heat and so should be worn in winters.

(v) At high temperatures nylon fibers melt to form beads.

(vi) Nylon fiber is flexible and so is used for making hosiery apparels.

(vii) At room temperature, nylon fibers neither stretch nor shrink.

(viii) Nylon fibers are heat set into a required shape and size. They do not change their size, pleats over time.

(ix) All nylon clothes have smooth surface. Thus, dust cannot stick on them and they can be washed easily.

Chemical properties–

(i) There are many types of chemical fibers– nylon, Dacron, acrylic, etc.

(ii) Nylon is severely affected by acids. Acids like sulphuric acid, hydrochloric acid, nitric acid damage fibers.

(iii) Nylon fiber is unaffected to bases. They can be washed with any soap.

(iv) Nylon is good surface for dyes.

(v) Light colored nylon is affected by light and sun.

(vi) Fungus and insects do not attack nylon clothes.

(vii) Nylon is used for making curtains and night dresses. They can be mixed with other fibers for many uses.

2. Polyester–

Polyester is manufactured in the same way as nylon. Dicarboxylic acid and dihydric alcohol reacts first to get polymerized in a polymerizing vessel. Ribbon shaped product is obtained from this vessel. Ribbons are cut into chips and are sent into hopper from where they are sent to melt spinning tank for mixing. This hot solution is passed through spinneret and the fibers so obtained are dried up in the presence of air. These fibers are stretched to form strong threads.

Properties and uses

(i) Clothes made from polyester have high breaking tenacity, elasticity and resiliency.

(ii) Polyester shrinks at high temperatures and melts into a black colour residue.

(iii) Polyester clothes are wrinkle resistant. So there is no need to iron them.

(iv) Polyester is a strong fiber. They can be mixed with other fibers to make comfortable clothes.

III. Specialized fibers–

Mixed fibers–

We have read about properties and limitations of various fibers. Every fiber has its own properties. All properties are not present in a single fiber. For example, cotton clothes provide cool effects but they get wrinkles. Nylon clothes are warm but they do not get wrinkles. If cotton and nylon are mixed to form clothes then such a cloth will be cool as well as free from wrinkle.

In this way we can mix two or more fibers to develop mixed fibers. Two types of fibers can be spun together to form a single thread to two types of threads can be used for making a single cloth. Some examples are terrycot, cots wool, terriwool, khadi silk, etc. Because these mixed fiber apparels are easy to maintain are, less expensive and are in fashion today.

Commonly available mixed fibers are–

Mixed fiber	**composition**
Terrycot	terylene + cotton
Cottswools	cotton + wool
Terrywool	terylene + wool
Terry silk	terylene + silk
Cotton silk	cotton + silk

1. Terrycot

This mixed fiber cloth has properties of both terylene and cotton. It has coolness, sweat absorbing capacity and comfort properties of cotton. Because of terylene it is durable, beautiful, shining, shrinkage resistant. These types of clothes are wash and wear type because they do not require ironing.

2. Terry silk

These mixed fibers are strong, durable and shrinkage resistant because of terylene and is shining and attractive because of silk.

3. Terry wool

Because of terylene it is wrinkle free, shrinkage resistant, strong, friction resistant and its flexible, beautiful and warm because of wool.

IMPORTANT POINTS:

1. Clothes are one of the basic requirements of humans.
2. Fiber is the smallest unit of cloth.
3. Fibers are classified on the basis of their sources and manufacturing process.
4. Fibers are of 3 main types– natural, artificial and mixed fibers.
5. Cotton and linen are vegetable fibers which are made of cellulose.
6. Silk and wool are animal fibers and are made of protein.
7. Artificial fibers are of two types–man-made and chemical.
8. Different fibers have different physical and chemical properties.
9. Two or more than two fibers are mixed together to form mixed fibers.
10. Mixed fiber clothes are more useful because they are made of different types of fibers and have qualities of each one of them.

EXERCISE:

1. Choose the correct option:

(i) Animal fiber is

(a) Cotton (b) Wool

(c) Linen (d) Kapok

(ii) Longest fiber is

(a) Silk (b) Cotton

(c) Wool (d) Linen

(iii) Chemical fiber is

(a) Hemp (b) Linen

(c) Nylon (d) Rayon

(iv) Linen is a ——— fiber

(a) Animal (b) Vegetable

(c) Mineral (d) None of the above

2. What is a mixed fiber?
3. How does water affects woolen clothes?
4. What percent of cellulose is present in cotton fiber?
5. What is fleece cotton?
6. What is the effect of acids and bases on silk?
7. Name the animal fiber.
8. Why is rayon known as man-made fiber? How is it different from chemical fibers?
9. Write in short about jute, hemp and kapok.
10. Explain composition, structure and properties of linen.
11. Write the classification textile useful fibers.

ANSWERS:

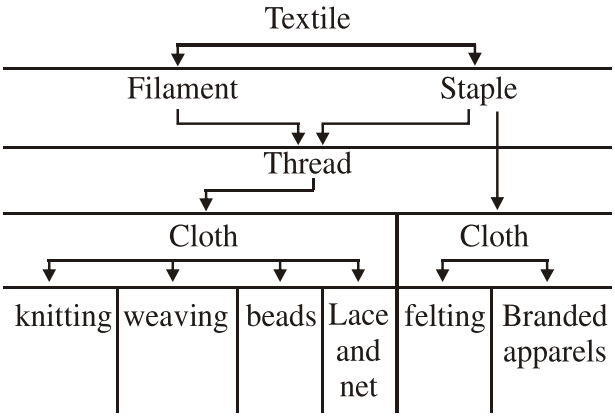
(i) b (ii) a (iii) c (iv) b

CHAPTER : 20

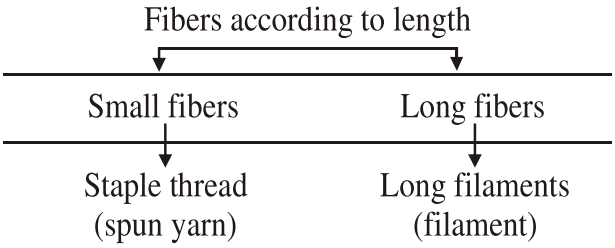
SPINNING AND YARN MAKING

Since ancient times man has felt the need of covering his body. As the civilization and culture developed textile manufacturing started developing.

The initial and smallest unit of textile is called a fiber. Fibers are placed together, stretched, twisted and stressed together to form an unending long thread called yarn. This yarn is used for making textiles.



Yarn is prepared using long and short threads. Formation of threads is known as spinning.



Stages of yarn construction–

For yarn making small natural fibers are joined together to from long fibers. Artificial fibers or polymers are passed through holes of spinneret forming long threads. The stages of thread formation are as follows:

Table : 20.1

Method of making yarn				
Carding (removing impurities)	Combing (to arrange in parallels)	Drawing out (separating short and long fibers)	Roving (slightly twisting fibers in water)	Spinning (preparing thread)

1. **Carding–** The fibers obtained from natural sources are generally tangled and are impure. By the process of carding these impurities are removed and fibers are arranged in a straight line in parallels.
2. **Combing–** In combing the fibers are combed to remove tangles. This separates short and long fibers and fibers become straight and parallel. Small fibers are used to make low quality apparels.
3. **Drawing out–** The process of separating short and long fibers is known as drawing out. For this the fibers are wound on spools which move in circular motion continuously. This separates long fibers from small ones and prepare a yarn of required thickness or diameter.
4. **Roving–** The drawn out thread is slightly twisted. The straight and parallel fibers come

together by this process and the weak thread becomes strong, dense and durable. This thread is then sent for spinning.

5. **Spinning–** This is the last step in the process of thread making. The roved thread is sent into the spinning machine which has fixed rollers. Each roller has speed more than the preceding roller. Thread is passed through these rollers. As the thread passes through the last roller, it becomes of intended size and diameter.

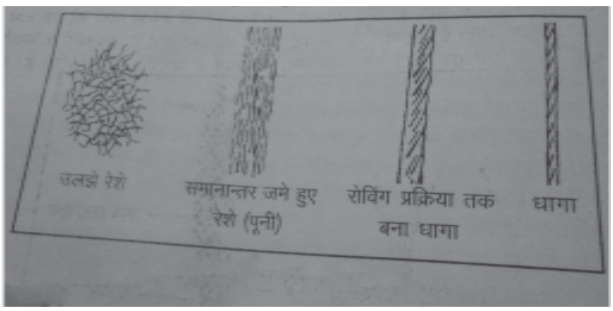


Figure : 20.1 (Stages of thread making)

Thread gets ready by spinning. On the basis of length, thread is of two types–

1. Short length or staple thread
2. Long filament

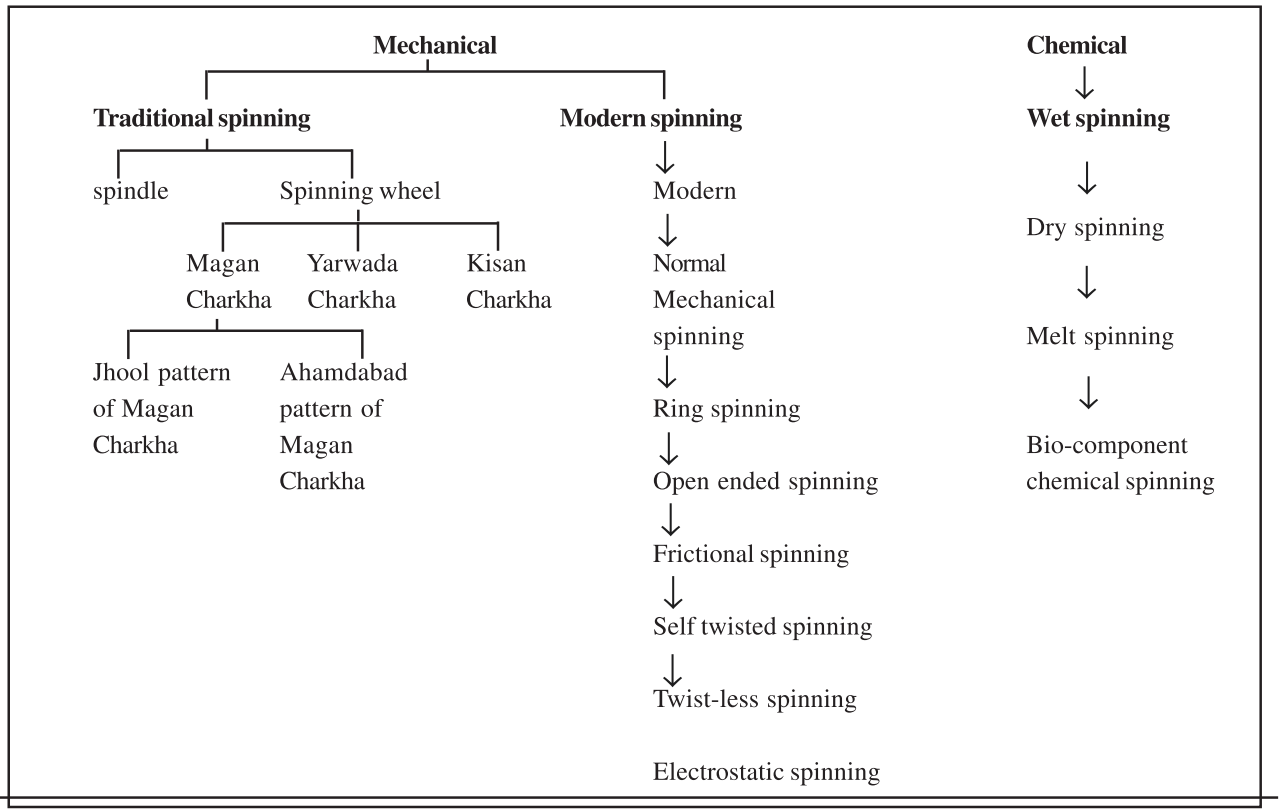
Types of spinning

In present times, thread is prepared in two ways–

1. Mechanical spinning
2. Chemical spinning

1. **Mechanical spinning–** normally this type of spinning is used for making threads from natural fibers. In this traditional method of spinning using spindle and spinning wheel is used. In modern spinning, normal mechanical spinning, ring spinning, open end spinning, frictional spinning, electrostatic spinning are used.
2. **Chemical spinning–** thread making from artificial fibers requires chemical spinning. Wet

Table 20.2: Types of spinning



spinning, dry spinning, melt spinning, and bio-component spinning are different methods of chemical spinning.

Classification of yarns—

Mechanically and chemically made threads are of two types–

1. Simple
2. Mixed and fancy threads

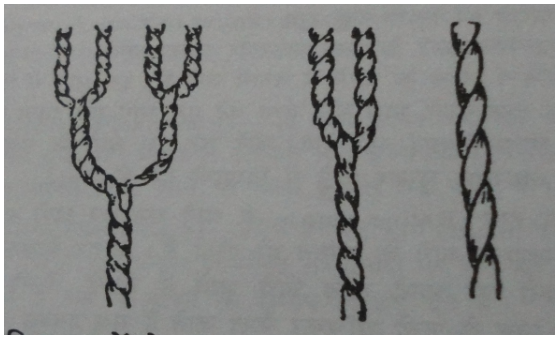


Fig. 20.2 Normal threads
(four ply, two ply, one ply)

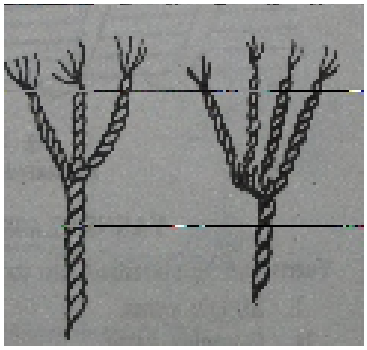


Fig. 20.3 Card yarn

1. Simple threads– this thread is made of a single type of fiber. It is single or double layered.
2. Mixed and fancy thread– this thread is of complex structure and is made up of more than one type of fibers.

Strength of thread– Strength of fiber is measured in two ways–

1. Fixed Weight System

Table 20.3 : Types of yarns

Types of yarn

Simple	**Mixed**
Simple - Weak long fibre	1. slubyarn– Twists at regular turns
Double - Mixed of two different single stand yarn	2. Flak– Less separated or not at all separated (weak)
Multiple - Mixing many single strand yarn	3. Spiral– Difference between diameter, length and thickness of thread
Cable or cord yarn - Rope or lanyard	4. Retyne looped between length of thread
	5. Coiled loops– Different types of loops in he length of thread
	6. Knotted thread– Appearance of stains
	7. Gaadal two or more types of colored threads
	8. Stretch- Stretchable threads
	9. Textured– Artificial surface thread, stretchable thread, big artificial looped crimp
	10. Novelty
	11. larotex

(b) Shining of thread

(c) Method of spinning

(d) Length of thread

2. Fill in the blanks–

(i) The process of making thread from fibers is called ————-

(ii) For making thread from natural fibers, ———— spinning method is used.

(iii) Artificial thread is made using ———— spinning method.

3. What is filament?

4. Define cording.

5. Define mixed thread.

6. What is —— thread?

7. What is fixed weight system?

8. Explain the process of thread making.

9. What is spinning process? Classify spinning.

10. Write classification of thread.

11. How is strength of thread counted?

ANSWERS:

1. (i) a (ii) b (iii) a (iv) a

2. (i) spinning (ii) mechanical (iii) chemical

CHAPTER : 21

WEAVING

With the development of human civilization, man progressed in textile manufacturing. Man's attraction for nature's admirable creation led to the discovery of soft, flexible, strong fibers from which textiles are manufactured.

Table 21.1: Textile Manufacturing

Textile manufacturing without fibers	Textile manufacturing using fibers	Textile manufacturing from yarn	
— Paper (napkins)	— Numdah (woolen clothes made from action of heat and pressure)	— Twisting (shoe lace)	
— Plastic film and sheet (for support to the lower layer of textiles)	— Needle punch method (clothing with net)	— knitting	
— Polyurethane foam (insulator of sound and heat)	— Branded clothes without weaving (on heat ---clothes using heat and pressure)	— Warp knitting	— Weft knitting
— Island clothing (people living on islands wear layered clothes)	— Mechanically branded clothing, double weaved (blankets, carpets, etc)		— Ex- raschel, tricot
	— Laminated clothing (quilt, foam on clothes, clothes pasted on clothes)		

Textile manufacturing is done in 3 ways— (Table 21.1)

1. Textile manufacturing without fibers– The textile prepared in this method is less lasting and less useful. Paper napkins, plastic films, plastic sheets, polyurethane foam is prepared under this method.
2. Textile manufacturing using fibers– From this method numdah, needle punched clothes, branded clothes without weaving, laminated clothes, and mechanically prepared branded clothes are made.
3. Textile manufacturing from yarn or thread– Laces are prepared by twisting two or more

threads together, clothes from knotting is prepared under this method.

Different methods of textile manufacturing using the above 3 ways are—

1. **Numdah formation**— This is a fiber using textile manufacturing method. Numdah is generally prepared from woolen fibers because wool has the quality of setting under the effect of temperature and pressure. Therefore, numdah formation is a technique in which loosened and moistened short fibers are twisted together and then they are subjected to pressure and heat into forming of cloth. Today automatic machines are available for numdah formation. The length and breadth of numdah is according to requirements but its thickness is not more than 3" and not less than 0.01". Blankets, shawls, coats, caps are are also using this technique.
2. **Knitting–** This is a thread using textile manufacturing technique. Knitted fabric consists of a number of consecutive rows of interlocking loops. As each row progresses, a newly created loop is pulled through one or more loops from the prior row, placed on the gaining needle, and the loops from the prior row are then pulled off the other needle. Woolen apparels from cotton, sweater, socks and shawls from artificial fibers are knitted. Knitted apparels take the shape of body.
3. **Braiding or lace–** Braid means interlocked lace. Two or three laces are interlocked together to form flattened, thin or round strips. These strips are stitched on the corners of Kashmiri shawls. Lace can be prepared by both hands and machines. For making laces, special needles like Croatia, tatting. To make apparels beautiful and attractive braids or laces are used.
4. **Weaving–** This is an ancient and popular technique of textile manufacturing. A longitudinal and a transverse thread is used which are called warp and weft respectively. These two threads are interlaced at right angles to form a fabric.

Process of weaving—

The weaving process consists of five basic operations, shedding, picking, beating-up, left off and take up.

1. **Shedding:** Separating the warp yarns into two layers by lifting and lowering the shafts, to form a tunnel known as the 'shed'.
2. **Picking or Filling:** As the harnesses raise the heddles which raise the warp yarns, the shed is created. The filling yarn is inserted through the shed by a small carrier device called a shuttle. A single crossing of the shuttle from one side of the loom to the other is known as a pick.
3. **Battening or Beating-up:** The portion of the fabric that has already been formed but not yet rolled up on the take-up roll is called the fell. After the shuttle moves across the loom laying down the fill yarn, the weaver uses the reed to press (or batten) each filling yarn against the fell.
4. **Let off and Take up:** The warp yarns are unwound from the warp beam during the above three processes. The woven fabric is wound on the cloth beam in the above three processes.

The above operations must be synchronized to occur in the correct sequence and not interfere with one another.

Types of weaving– Weaving of clothes is done

using a loom. Before the invention of loom, the process of weaving took lot of time and labor. With the help of loom the process has become simple and easy. Initially a handloom was used and now a mechanical loom is used for weaving. Mechanical loom takes less time, effort and produces more quantity of textile than a handloom.

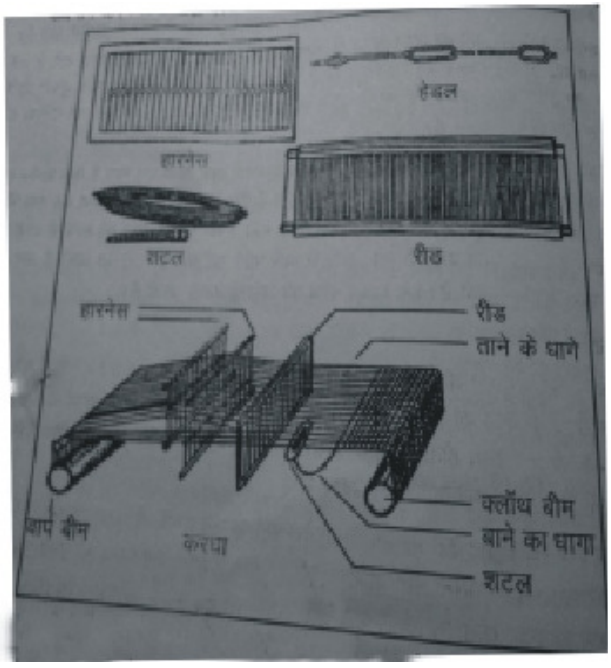


Figure : 21.1 (Different Part of Loom)

Loom:

A loom is a device used to weave cloth and tapestry. The precise shape of the loom and its mechanics may vary, but the basic function is the same. Following are the parts of a loom:

1. **Warp beam**– It is cylindrical in shape and is at the back side of the loom. The warp sheet is wound on this beam. The end of warp sheet is tied to the cloth beam. This warp beam continuously moves, as the weft thread fills up it slows down the speed and loosens the thread so that the warp thread can now be filled and weaving continues.
2. **Cloth beam–** It is fixed on the front side of loom. The end of warp sheet is tied to it. As the weaving starts, the fabric or cloth gets wound on it. That is why it is known as cloth beam.
3. **Harness–** It controls the warp thread and helps in weaving. It is a frame with thousands of wires known as heddle. There is a small hole in the heddle from which the thread reaches the warp beam. One thread from one heddle comes out. Harness controls the up and down motion of thread.

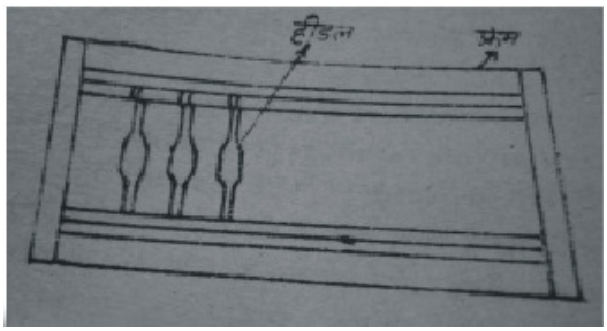


Figure : 21.2 (Harness its Hiddle and Fram shown)

4. **Shuttle–** It is basically a weft carrier and helps in interlacement of the weft with the warp threads to form cloth. The shuttle passes from one end of the loom to the other.

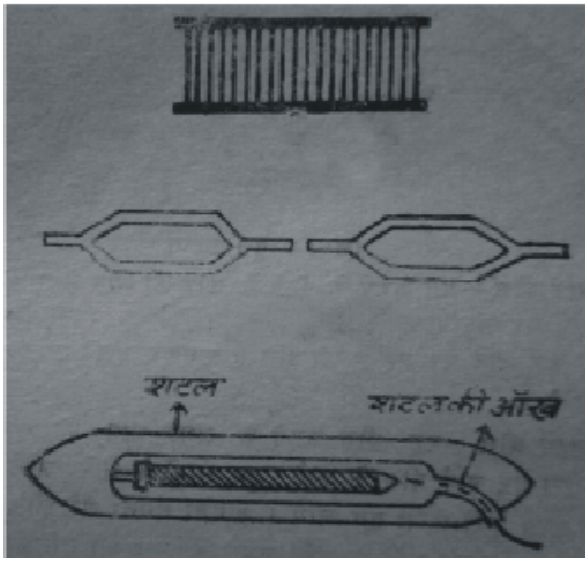


Figure : 21.3 (Shuttle)

moves across the loom, the reed is used to press or batten the yarn to make the fabric.

The type of weaving depends on the technique of braiding. There are two types of weaving– (1) Simple weaving, (2) Fancy weaving. Here we will discuss three types of weaving.

1. **Plain Weave:** It is the most simple and most common type of weaving. In plain weave, the warp and weft are aligned so they form a simple criss-cross pattern. Each weft thread crosses the warp threads by going over one, then under the next, and so on. The next weft thread goes under the warp threads that its neighbor went over, and vice versa. To bring a difference in plain weaving, wrap and weft threads of different thickness are used. It is strong and hard-wearing, used for fashion and furnishing fabrics. Canvas, muslin, chiffon, organza are made using a plain weave.

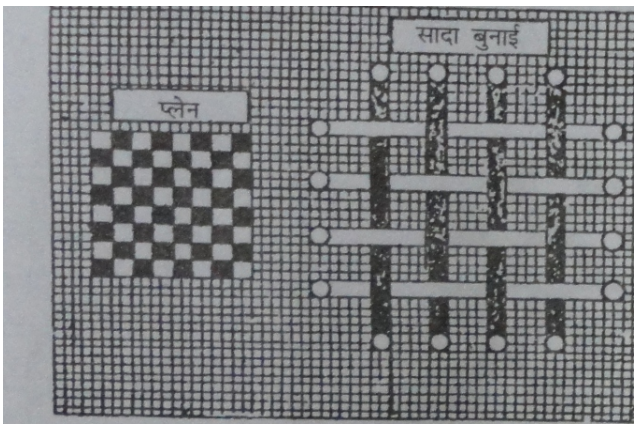


Figure : 21.4 Plain Weave

2. **Twill weaving–** A twill weave can be identified by its diagonal lines. This is done by passing the weft thread over one or more warp threads then under two or more warp threads and so on, with a "step," or offset, between rows to create the characteristic diagonal pattern. Soiling and stains are less noticeable on the uneven surface of twills than on a smooth surface, such as plain weaves, and as a result twills are often used for sturdy work clothing and for durable upholstery. Denim, for example, is a twill.

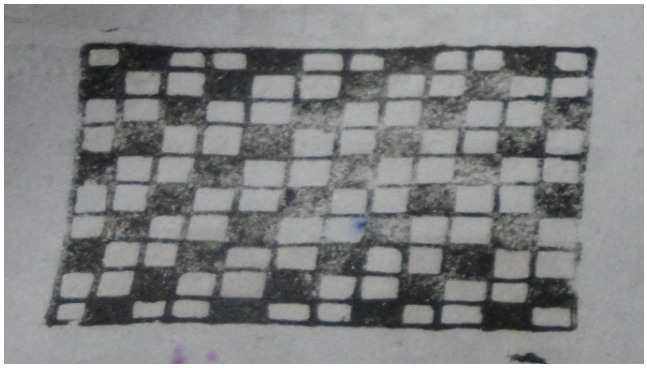


Figure : 21.5 Twill weaving

3. **Satin weaving–** Satin is a weave that typically has a glossy surface. Satin is usually a warp-faced weaving technique in which warp yarns are "floated" over weft yarns, although there are also weft-faced satins. This makes the surface glossy. The satin weave is characterized by four warp yarns floating over a single weft yarn, which makes only warp thread visible and hides weft. Fabrics made form silk, rayon and chemical fibers are prepared in the mems. These fabrics are beautiful and are especially worn on special occasions. This weaving is not very durable and strong.

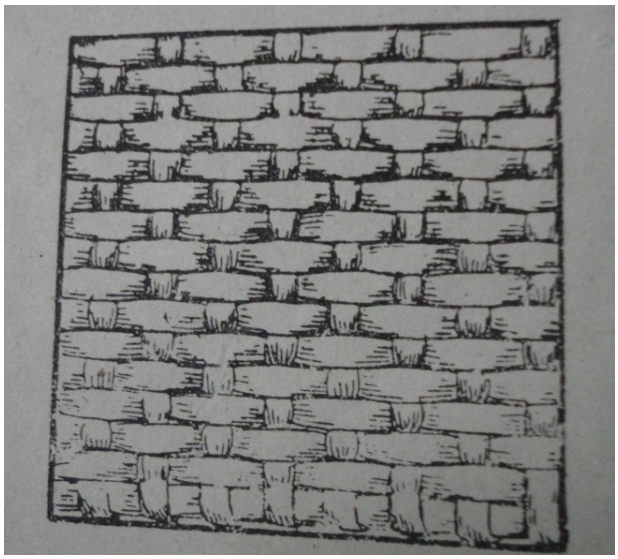


Figure : 21.6 Satin weaving

Table 21.2: Stitches of weaving

Back stitch	Straight stitch	Tuck	Misc

Table 21.2: Classification of weaving

Simple	Fancy
Plain	Pile
Rib	Dobby
Satin	Double cloth
Selin	Crepe
Basket	Corduroy
Twill	Velvet
Honeycomb	Leno
Huckback	Paracord
	Swivel

Table 21.3: Lace and net

Croatia	Novelty lace	Needle made lace	Shuttle	Pillow lace

Selvage:

A selvage or selvedge is a self-finished edge of fabric. The selvages keep the fabric from unraveling or fraying. In woven fabric, selvages are the edges that run parallel to the warp and are created by the weft thread looping back at the end of each row.

Table 21.4: Selvage

Plain selvage	Cut selvage (small fabrics like towel, handkerchief, napkin, etc)	Tape like selvage	Fused selvage (fusing the end fibers by melting)

Coefficient of fabric:

The quality, durability, working depends on the density and compactness of weaving. This dense weaving depends on the number of warp and weft threads. The More the number of warp and weft, the more durable, strong, smooth and dense the fabric is.

The number of warp and weft present in one square inch of fabric is known as coefficient of fabric. Number of warp + number of weft = fabric coefficient

Balance of fabric:

The proportion of warp and weft in fabric is known as balance of fabric. If the wrap and weft are equal then the balance of cloth is good. one imbalance can deteriorate the quality of fabrie.

IMPORTANT POINTS:

1. Textile manufacturing is done using fibers and threads by felting, knitting, braiding, weaving, etc.
2. Numdah, mechanical branded clothes, laminated clothes are made using fibers.
3. Using thread fabric is made by knitting,

braiding, weaving, etc.

4. Knitted fabric consists of a number of consecutive rows of interlocking loops.
5. Warp and weft are interlaced at right angles to form a weaved fabric
6. The main parts of a loom are warp beam, cloth beam, harness, shuttle and reed.
7. The process of weaving involves shedding, picking, battening, let off and take up.

EXERCISE:

1. Choose the correct option:

(i) The fabric is prepared from
(a) Fibers (b) Thread
(c) Fiber and thread (d) None of these

(ii) The parts of loom are
(a) Carding (b) Spinning
(c) Warp beam and cloth beam
(d) Weaving

(iii) The quality of fabric depends on
(a) Number of warp and weft
(b) Process of knitting
(c) Strength of cloth and warp beam
(d) Selvage

(iv) The strongest fabric is made using
(a) Plain weave (b) Twill weave
(c) Satin weave (d) Fancy weave

2. Fill in the blanks:

(i) Clothes made from woolen fibers are called ———-

(ii) ——— is used for weaving clothes by the process of shedding, picking, etc.

(iii) Clothes made from ——— technique takes the shape of body.

(iv) ——— performs the function of battening during weaving.

3. Explain the different ways of textile manufacturing.
4. How is numdah prepared?
5. What is a cloth beam?
6. Write names of five fancy weaves?
7. Write a paragraph on twill weaving.
8. What is a loom? Explain the different parts of a loom.
9. Explain the process of weaving and types of weaving.
10. Explain plain and satin weave with diagrams.
11. What do you understand by selvage, fabric coefficient and fabric balance?

ANSWERS:

1. (i) c (ii) c (iii) a (iv) b
2. (i) numdah (ii) loom (iii) knitting (iv) reed

CHAPTER : 22

TEXTILE FINISHINGS

The fabric requirements of by humans and the research on fabric science have revolutionized the industry of textiles. Gray goods, or fabrics that are in a "gray" or "loom" state, are woven fabrics that have not yet gone through the finishing processes. They have not yet been dyed and have the natural color of the fiber. Since ancient times man has undertaken the activity of textile finishing for the fulfillment of following objectives–

1. To increase the external beauty
2. To increase the quality of fabric
3. To increase diversity of fabrics
4. To increase usefulness and purpose of fabric
5. To increase service related qualities and durability
6. To make fabric exemplary and artificial
7. To make storage of clothes easy
8. To make clothes heavy and stiff
9. To make low quality clothes look attractive

Factors affecting Finishing

Researchers have made inbened methods for finishing and refinement. Effect of finishing on cloth depends upon the nature and purpose of cloth. Use of finishing depends upon following elements-

1. **Nature of fibers –** cloth usefulness depends upon physical and chemical properties of fibers, on this basis different processes can be used for giving finishing to texlets depending on our needs.
2. **Methods of weaving -** Finishing that given to cloth depends upon the various methods of weaving of cloth. Any type of finishing of can be given to the cloth which is weaved with same magnification but finishing cloths made with complex and diverse tenants is also a complex process.

Aesthetic attraction and fashion has revolutionized the textile finishing industry. This industry has gradually expanded. Everyday some new modified finishing method is seen in the market.

Textile finishing can be divided into 3 groups for the purpose of fulfilling the objectives:

(1) Mechanical,
(2) Chemical,
(3) Special finishing

Special finishing– Finishing done for special purposes comes under this group. Finishing for making fabric water resistant, fire resistant, insect-repellent, etc. fall sunder this category.

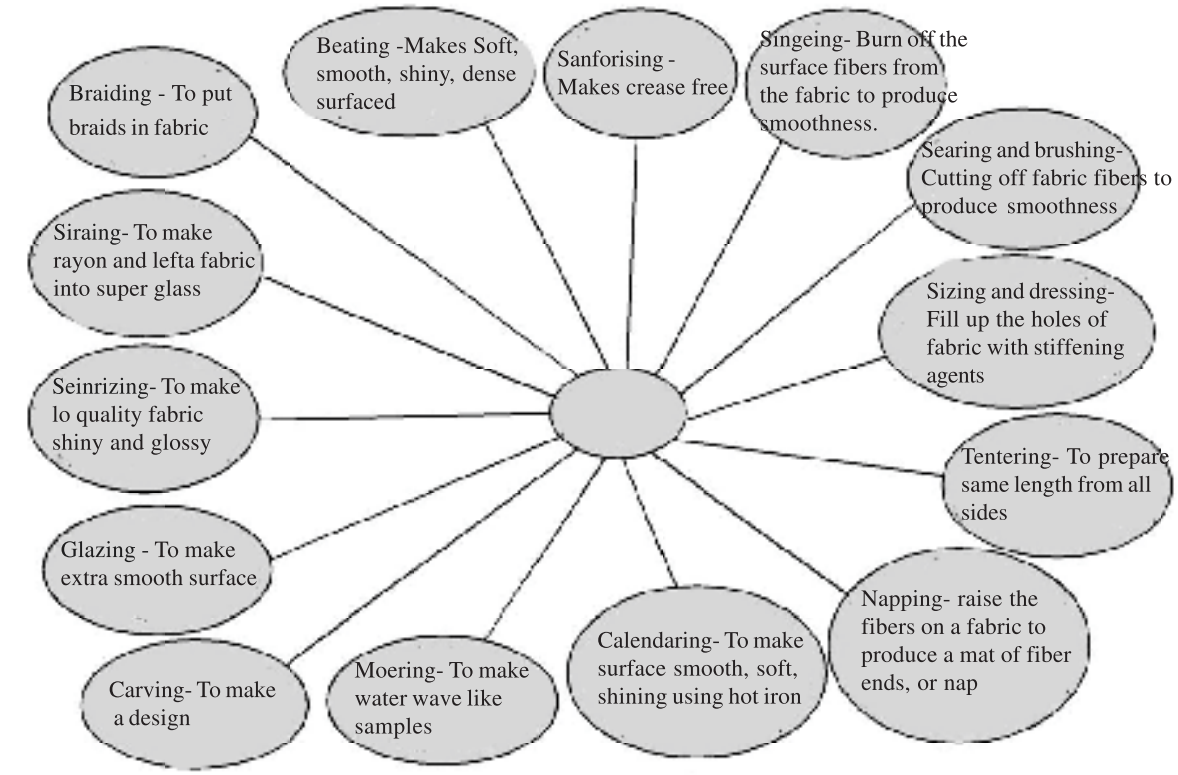
Textile finishing on can be grouped on the basis of usefulness and stability of medium:

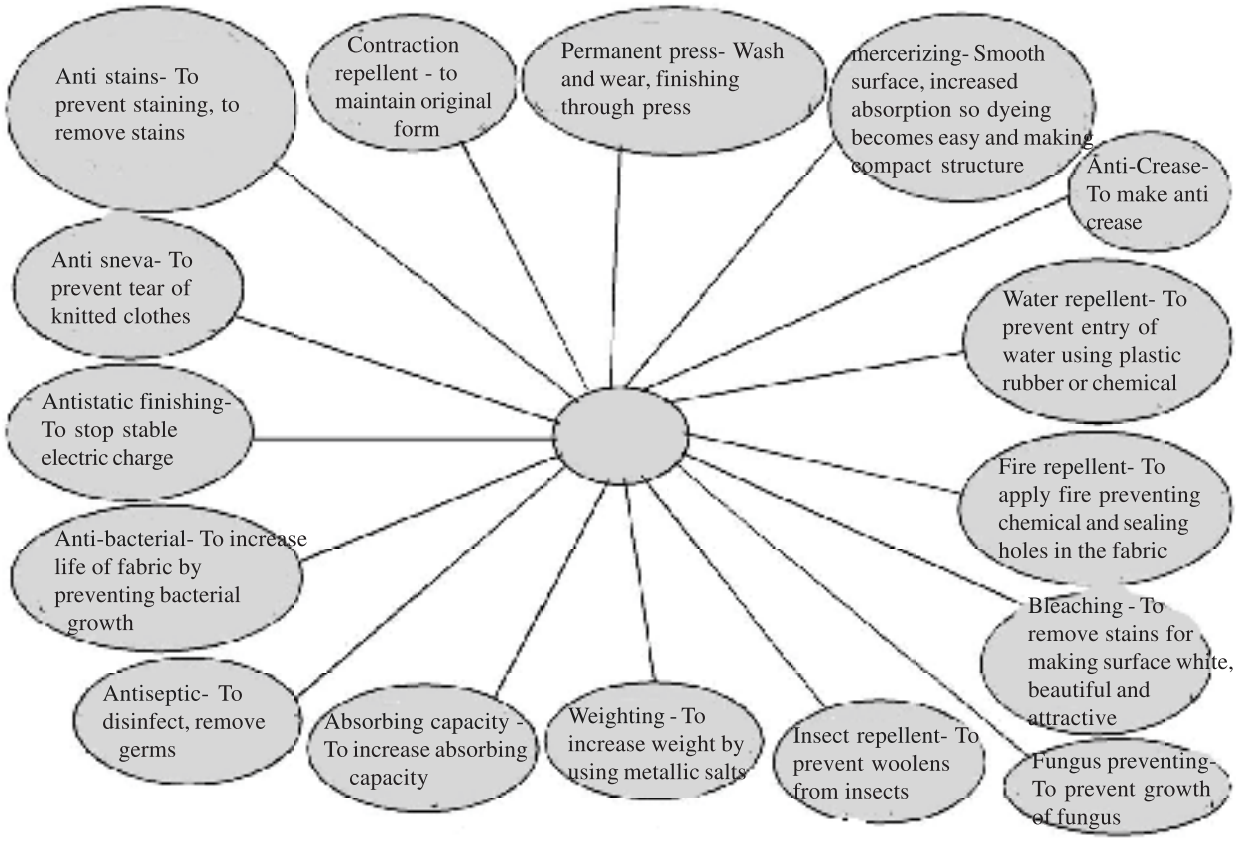
1. Mechanical (figure : 22.1)
2. Chemical (figure : 22.2)

1. **Beating–** Weaved cloth is stiff, has rough

surface and has some holes. To make such a cloth smooth and shiny, it is beaten with a wooden or iron hammer. This activity fills the holes and flattens the threads and makes the structure of fabric dense and compact.

2. **Singeing**– Singeing is designed to burn off the surface fibers from the fabric to produce smoothness. The fabric passes over brushes to raise the fibers, and then passes over a plate heated by gas flames.
3. **Scouring**– this is a temporary finishing. Once the fabric is washed it gets removed. To fill up the holes in the cloth and to make it stiff wax, starch, gum, gelatin, magnesium sulfate, magnesium chloride is used and to make it shiny wax, paraffin, etc. is used. To make the fabric stringent, fabric is passed through a roll dipped in the stiffening agent and the agent sticks on both the sides of fabric making the fabric stiff.
4. **Tentering**: Tentering is a mechanical finish where the fabric is held horizontally by each selvedge between pins. There is a tenter frame which moves faster than the speed with which the chains holding the fabric are moving. This process straightens the fabric which involves many finishing processes like mercerizing, resin finishing and drying.
5. **Calendaring (Pressing)**: Calendaring is also called pressing done on cotton, wool, and silk as well as rayons. It is a mechanical process where the fabric is fed between flat, heated plates and pressed under heat and pressure. As for wool the fabric is fed between needle boards, which help retain the pile finish. Calendering must be renewed after each laundering or cleaning.
6. **Moering**– On the surface of cloth, samples similar to stripes of water are made, for this purpose moering machine has three types of rollers installed. On the top most rollers, cloth is wound. Then cloth is passed through first and then second roller. In comparison to first roller, speed of second roller is more. Due to which stripes of water are made on the surface of cloth. After that minute and fine lines are drawn that shines in light.
7. **Mercerization**: Mercerization is a chemical finish mostly done on cotton fabrics. The fabric is immersed in 16-27 percent of sodium hydroxide and fed between rollers for a specific period of time. Then it is passed on a tentering frame to have specified dimensions. At last it is washed and dried. This process causes the fabric to have more luster, improved dying characteristic and strength.
8. **Anti-Shrinking Finishing**- This finishing is given to prevent the shrinking of the cloth. This finishing is given after washing the cloth that is obtained from loom. For this cloth is immersed in warm water and then in cold water, either using steam or chemicals fabric is given a definite shape. After this process the fabric does not shrink. 'Pre-shrink' label is put on such clothes.
9. **Anti-crease finishing**– Due to lack of flexibility and resilience in cotton, linen fabrics easily get wrinkled, to prevent this they are given anti-wrinkle finishing. For this finishing, chemical rolls are dipped in phenol formaldehyde or urea formaldehyde and they are used on clothes to make them flexible, this way the fabric gets flexibility and thus becomes wrinkle free.
10. **Water repellent**– All the fabrics to be used in rainy season are made water repellent so that water does not enter the fabric. For this very


Beating -Makes Soft, smooth, shiny, dense surfaced
Sanforising - Makes crease free
Singeing- Burn off the surface fibers from the fabric to produce smoothness.
Braiding - To put braids in fabric
Searing and brushing- Cutting off fabric fibers to produce smoothness
Siraing- To make rayon and lefta fabric into super glass
Sizing and dressing- Fill up the holes of fabric with stiffening agents
Seinrizing- To make lo quality fabric shiny and glossy
Tentering- To prepare same length from all sides
Glazing - To make extra smooth surface
Napping- raise the fibers on a fabric to produce a mat of fiber ends, or nap
Calendaring- To make surface smooth, soft, shining using hot iron
Moering- To make water wave like samples
Carving- To make a design


Anti stains- To prevent staining, to remove stains
Contraction repellent - to maintain original form
Permanent press- Wash and wear, finishing through press
mercerizing- Smooth surface, increased absorption so dyeing becomes easy and making compact structure
Anti-Crease- To make anti crease
Anti sneva- To prevent tear of knitted clothes
Water repellent- To prevent entry of water using plastic rubber or chemical
Antistatic finishing- To stop stable electric charge
Fire repellent- To apply fire preventing chemical and sealing holes in the fabric
Anti-bacterial- To increase life of fabric by preventing bacterial growth
Bleaching - To remove stains for making surface white, beautiful and attractive
Antiseptic- To disinfect, remove germs
Absorbing capacity - To increase absorbing capacity
Weighting - To increase weight by using metallic salts
Insect repellent- To prevent woolens from insects
Fungus preventing- To prevent growth of fungus

purpose a rubber or plastic made chemical sheet is applied on the fabric. This chemical covers all the holes in the fabric so that water slips from surface. But this type of cloth is not good for health. Nowadays good quality of water repellent fabrics is available in the market which is also good for health.

11. **Fire – preventing finishing**– For this type of finishing, a thick layer of ammonia sulfate is applied on a simple cloth so that the threads of cloth get completely covered. The threads are completely concealed with fire preventing material and thus cloth does not catch fire. This is useful for firemen.
12. **Prevention from insects**– Woolen, silk and other precious fabrics are protected from insects by applying a fluoride solution on the fabrics. This fluoride is poison for the insects and the clothes remain protected.
13. **Prevention from fungus**– Clothes stored in sealed and moist areas develop fungus and there appear black patches on the fabric. To protect the fabric from fungus magnesium fluoride, calcium chloride or zinc chloride, formaldehyde, turpentine are used.

Thus for different purposes different types of finishing can be done and the fabric can be refined.

IMPORTANT POINTS:

1. Gray goods are fabrics obtained from looms.
2. Finishing om textile means performing various actions on fibers, threads and fabric to make it useful and purposeful.
3. Finishing done using mechanical means is called mechanical finishing. Finishing done using chemicals is called chemical finishing.
4. Textile finishing depends on nature of fibers and method of weaving.

EXERCISE:

1. Choose the correct option:

(i) Fabric prepared from loom is

(a) Gray goods (b) coarse fabric

(c) refined fabric (d) smooth fabric

(ii) Example of mechanical finishing

(a) Sizing

(b) mercerizing

(c) Fire-preventing finishing

(d) insect repellent

(iii) Finishing is done on

(a) Fabric (b) Fiber

(c) Both the above (d) Thread

(iv) Example of chemical finishing

(a) tentering (b) beating

(c) Napping (d) fungus repellent

2. Fill in the blanks:

(i) Textile finishing is done on the basis of today's _____-

(ii) Mechanical finishing is done using _____

(iii) Chemical finishing is done using _____

(iv) In mercerizing _____ chemical is used.

(v) In moering finishing samples like _____ are made on fabric surface.

3. Write the objectives of finishing on textils.
4. Write the meaning of textile finishing and explain mechanical and chemical finishing with examples.
5. Write short notes on:

(i) Stiffening

(ii) Anti-crease finishing

(iii) Water repellent finishing

ANSWERS:

1. (i) a (ii) a (iii) a (iv) d

CHAPTER : 23

DYEING AND PRINTING

Due to lack of colour, finishing of cloth appears to be dull. Color does not only increase the beauty of cloth but also fills us with joy and cheerfulness. Dyes bring novelty and diversity in cloths. Use of color is going on from ancient times. In ancient times natural dyes were used. With the revolution of cloth industry, use of synthesized dyes has begun.

Types of dyes

1. **Natural Dyes**- Those dyes which are prepared from natural sources are called Natural Dyes. These dyes are obtained from plant sources, animal sources and mineral substances (Table no. 23.1).
2. **Artificial or Synthesized dyes**- In 1856, these dyes were discovered by Henry William Perkin while preparing quinine from aniline. These are also known as coal tar dyes.

(i) **Acidic Dyes-** These are used for dying woolen, silk clothes and synthetic fibres. These are not used for cotton clothes.

(ii) **Alkaline Dyes –** Useful for dying fibers made from woolen, silk and cellulose.

(iii) **Oxidase Dyes** – It is available in black and brown dyes. It is useful for dying cotton clothes and can also be used for dying silk and acetate clothes.

(iv) **Chrome Dyes –** Mostly clothes have dark dyes. After dying woolen clothes from acidic dyes, for the purpose of darkening the colour it is boiled in chromate solution.

(v) **Evident dyes –** For dying it, binder is not needed. It is of three types. Automatically Evident colour, Developed colour and Azoik colour, etc.

(vi) **Sulfur Dyes -** Used for dying Natural and artificial cellulose fibers.

(vii) **Disperse Dyes-** It is used for dyeing Nylon, Acrylic, Polyester, etc. clothes and Cellulose fibers.

(viii) **Achromatic Dyes-**

(ix) **Naphthol Dyes-** They are dark dyes for dyeing nylon, Polyester, Cotton and Rayon fibers. For dying them, binders are used.

(x) Vat dyes– Cotton, Linen and Rayon fibers are dyed. Along with nylon, Polyester and acrylic cloth can also be dyed. These are costly and insoluble.

Dyes- These are soluble in water. It can easily dye clothes. These are costly. These are assimilated in the fibers.

Pigment- These are insoluble in water. They remain stuck to upper layer of fibers. To dye cloth from a pigment, any type of sticking substance is used.

Table 23.1: Natural Dyes

Vegetables (different parts of plants -trees)		Minerals		Animals	
1. bark	Catechu	Iron powder	Chrome yellow, chrome green, chrome orange, Prussian blue,	1. fish	Purple, Tatareal
2. leaves	Henna				
3. stem	Turmeric			2. insects	Cochineal dye, red, orange color
4. flowers	Saffron, *Palash* (bastard teak), night jasmine				
5. fruits	Saffron, walnut, pomegranate, gooseberry, plum, *Harad* (Chebulic myrobalan), Baheda (Terminalia bellirica),				

Finishing of Clothes with dyes

Colour finishing which has brought novelty and variety in cloth industry is completed mainly by two methods:

(1) Dyeing (dipping the cloth in dye),

(2) Printing (Printing color on cloth according to a definite shape or pattern)

1. Dyeing– Dyeing is the process of adding color to textile products like fibers, yarns, and fabrics. Dyeing is normally done in a special solution containing dyes and particular chemical material for fixing the dye on textile products.

Stages of dyeing: dyeing can be done either with hands or machines.

(i) Fiber dyeing– This is known as dyeing of raw material. Dyeing on fiber is durable, dark and more even at all places. This is done in three ways:

(a) Top dyeing– Fibers of wool from which the short fibers have been removed is dyed by wounding the fibers on a reel.

(b) Drop dyeing– While preparing artificial fibers dye is added into the chemical solution and is passed through the spinneret.

(c) Stock dyeing– It is done by putting loose, unspun fibers in to large vats containing the dye bath, which is then heated at appropriate temperature required for the dye application and dyeing process.

(ii) Thread dyeing– the threads are tied to a rod and are dipped in large tanks filled with dyes. This dye stays on and does not get washed away.

(iii) Textile dyeing– keeping in mind demands of fashion and time, fabric can be dyed as per requirements. Fabrics can be re-dyed also. Fabric dyeing is not permanent as that on fibers and threads.

Methods of textile dyeing–

1. **Jig dyeing–** The fabric in jig dyeing is held on rollers at full width. These rollers are used for dipping the fabric in dyes at regular intervals. By this method any fabric can be dyed in any color in a short period.
2. **Cross dyeing–** This is a very popular method in which varied color effects are obtained in the one dye bath for a cloth which contains fibers with varying affinities for the dye used. Depending on affinities of fibers for different colors, dyeing can be performed. Single fabric with different colors thus look beautiful, attractive and fulfills the demands of consumers.
3. **Bandhani–** The dyeing method called as Bandhej is famous textile art of Rajasthan and Kathiawar. Bandhani of Jaipur and Patola of Gujarat are also famous.

Bandhani is a technique of tie and dye. The technique of Tie and Dye involves two stages: tying sections of a length of cloth (silk or cotton) and then dunking it into vats of colour. The tied part does not get dyed and the rest of the part gets dyed. To dye the fabric in many colors, dyeing starts with a light colour. As the dye gets dried the fabric is again tied and dipped in different colors.

4. **Reel dyeing–** Both the ends of a light weight fabric are sealed on a reel and then the fabric is dipped in a vat containing dye solution.
5. **United dyeing–** garment made from fibers of different categories is evenly dyed using this method.
6. **Continuous dyeing–** Excess long and big garments are dyed using machines. Dyeing to drying every function is performed by machines.
7. **Batik–** It is a technique of wax-resist dyeing applied to whole cloth, or cloth made using this technique. Using a brush hot wax is applied on the portion of fabric which has to be prevented from dyeing. After the wax dries the fabric is dipped in dye solution. Fabric except the wax applied portion gets dyed. After dyeing wax at some places get chapped. Wax has to be re-applied at the chapped places and then fabric is dipped for another round of dyeing. Wax is removed after the cloth is completely dried. This way beautiful and attractive dyeing is done.
2. **Printing–** Textile printing is the process of applying colour to fabric in definite patterns or designs. In properly printed fabrics the colour is bonded with the fiber, so as to resist washing and friction. For printing a semi-liquid paste of dye is prepared. Printing with different colors requires different design samples. Using any printing method, printing is done using different sample designs of colors. Thereafter the color of fabric is dried and fixed on the fabric.

Methods of printing–

1. **Block printing–** The blocks are usually made of wood or metal and the design is hand carved. Fabric is laid on a flat surface and the print paste is applied on the surface of the block and the block then pressed against the fabric. The process is repeated with different designs and colors.
2. **Roller printing**– Designs are carved on big rollers and the fabric passes through these rollers. The design gets pressed against the fabric. Different rollers with different design for different fibers are used. Hundred meters of fabric gets printed in a short period.
3. A method of printing same colored designs on both sides of fabric.

4. **Duplex printing–** A method of printing a pattern on the face and the back of a fabric with equal clarity.
5. **Spray painting–** In this method a mechanical air brush or hand held brush is used for spraying, making a design on the fabric.
6. **Screen printing–** In this method a special frame covered with a blocking substance is placed on the fabric and carefully printing paste is applied on the fabric. The area covered with blocking substance does not get any prints. Rest of the fabric gets printed.

In addition to these, Resist printing, Stencil printing, Warp printing, discharge printing, etc are also used for textile printing.

IMPORTANT POINTS:

1. Dyeing and printing are famous methods of textile finishing.
2. Dyes can be obtained both from natural and artificial sources.
3. Natural dyes are obtained from plant, animal and minerals sources.
4. Artificial or synthesized dyes are obtained from coal tar.
5. In dyeing, fiber, thread or fabric is dipped in dye to complete finishing work.
6. A semi-liquid paste is used for printing and colour is applied to fabric in definite patterns or designs

EXERCISE:

1. Choose the correct option–

(i) Developed dyes, evident dyes, azoic dyes are examples of
(a) Chrome dye (b) Evident dye
(c) Sulfur dye (d) Alkaline dye

(ii) Dyes and pigments are related to
(a) Natural colors (b) Artificial colors
(c) Sulfur colors (d) Synthesized colors

(iii) In Bandhej process of dyeing is by
(a) By tying the cloth
(b) directly dipping in color
(c) Both of the above
(d) dyeing by cutting

(iv) In roller printing, design is carved on
(a) Wooden block (b) rollers
(c) Both of the above (d) screens

2. Fill in the blanks–

(i) Dyeing and printing is a method of finishing using ————

(ii) ———— is obtained from natural colors.

(iii) ———— is obtained from artificial colors.

(iv) For dyeing textiles made from natural and artificial cellulose fibers ———— dye is suitable.

(v) In batik wax is used for ————.

3. Who and when discovered synthesized dyes?
4. What are natural dyes?
5. Write the types of dyeing.
6. Name any 5 methods of textile dyeing.
7. What is ——— printing?
8. What do you understand by dye finishing? Name the various dyes.
9. Write short notes on
(1) Dyes and pigments
(2) Cross dyeing
(3) Duplex printing
10. How is finishing done by dyeing method? Explain bandhej and batik.
11. What is printing? Write short notes on-
(1) Block printing
(2) Screen printing
(3) Spray printing

ANSWERS:

1. (i) b (ii) a (iii) a (iv) b
2. (i) dyes (ii) plants, animals and minerals
(iii) coal tar (iv) sulfur
(v) prevention from colors

UNIT : V
HOME MANAGEMENT

CHAPTER : 24
RESOURCES AND MANAGEMENT

Every person has many resources during his lifetime which helps him achieve his aims. We perform many activities in our daily life and for all the activities we need resources. Resources can be used in a number of ways. Therefore, the physical things available at a place are known as resources which can be used for fulfilling the requirements of society. For example a person needs money to buy a certain thing, knowledge and skill is required for earning money, hospital is required when someone falls ill. Man uses all these resources to fulfill his aims and needs.

In today's rapidly changing world man needs to acqure skils. The needs of man are changing with the changing environment. Therefore, man has to coordinate and skillfully use the available resources to the maxenimem for his own betterment and to fulfill his needs.

Classification of resources— Domestic resources can be divided into 2 parts–

Human resources		Non-human resources/ physical resources	
1	Knowledge- wisdom, having required the information.	1	Wealth- job, savings, business, labor wages
2	Qualification or skills- painting skills, tailoring skills	2	Physical goods- food, appliances, car, land, home, farm, etc
3	Interests- interest in a particular field like in songs, computer	3	Community facilities- transport, school, hospital
4	Attitude- conception and perspective towards a work	4	Energy- gas, coal
5	Strength- strength to do work		
6	Time- one hour, one day, one week, one month, one year or lifetime		

I. Human resources– Human resources are also called personal resources because they belong to man himself. They are one's own resources. These resources are limited but with consistent practice and knowledge they can be increased up to a certain extent.

1. Knowledge– Knowledge is power. Many appliances are available in the market today. A homemaker should have knowledge about these appliances and information on how to use them. Only if we have knowledge we can make choices from the available options and can prevent resources from getting wasted.

2. Qualifications or skills– A capable person will perform any work with skill. Every person

is skilled in or the other thing. e.g.- tailoring, embroidery, culinary skills, etc. Man should move forward in the area of his expertise or skill.

3. **Interests–** Interest is an important resource for achieving any aim. Interest increases work skill. Doing the work with interest is essential. Lack of interest makes work boring and tiring.
4. **Attitude–** The desire or feeling or either motivates for doing a work or de-motivates for not doing is known as attitude. Some people are optimistic while some are pessimistic. For example, we wish to start a new work and have apprehensions or fear before starting the work then that work will not be successful. An optimistic person faces even adverse situations with positivity.
5. **Strength–** Various physical and mental activities that are performed at home require support of family members. Therefore, we must know the proper way of doing things to spend less energy.
6. **Time–** Time is an important resource. Time once lost cannot be brought back. Every person gets limited and same amount of time. Therefore, it is one's duty to use time efficiently.

II. **Non-human resources or physical resources–** Physical resources can be achieved. These are not internal. We can see and feel them (figure 24.1).

1. **Money -** In exchangeable economy, in place of money or currency we receive things or services. For example, while taking services of a doctor we pay him money. It is not in same quantity with every person, it varies from person to person.
2. **Physical Things –** With the help of money, we can get physical things and property. For example- food, cloth, house, land, farm, etc. All these physical things are used to achieve our aims.
3. **Community Facilities –** The family is the first unit of society. Family receives some facilities only through society for which we do not have to pay. All people consume them according to their need and affordability. Some examples are School, Hospital, Library, Park, Roads, Police Conservation, Transport, Water-Electricity Distribution, etc.
4. **Energy –** Energy is an integral part of our life. Energy has various sources like light, cooking, running fans, to keep water and place warm, etc.

Importance of Family Resources

Family resources are very important for Home Management. To achieve family's goals, we need to know different family resources and their usefulness. With proper use of resources we can fulfill more and more needs. Home manager should estimate every member's ability and interest and use them to achieve goals. For example- someone has interest in stitching, someone has special interest in embroidery and it is his/her ability. It can benefit the family members because if stitching can be done at home there is no need to go to tailor and we can save money.

Resources can be humanitarian or physical but everything is useful. So, we should use resources wisely in proper many way so that we can make maximum use of them, can get maximum satisfaction, can fulfill maximum needs and can make life happy and successful.

Figure : 24.1 (Physical resources)

Management

Management is involved in every action of humans. In simple words, meaning of management is or that method of doing work by which we can use all available resources in optimum way in any situation to try to fulfill our maximum aims and needs.

Definition of Home Management: Home management is the process of effectively running a household. According to Rajammal P Devadas, home management includes making decisions regarding use of family resources to achieve the aims of our family.

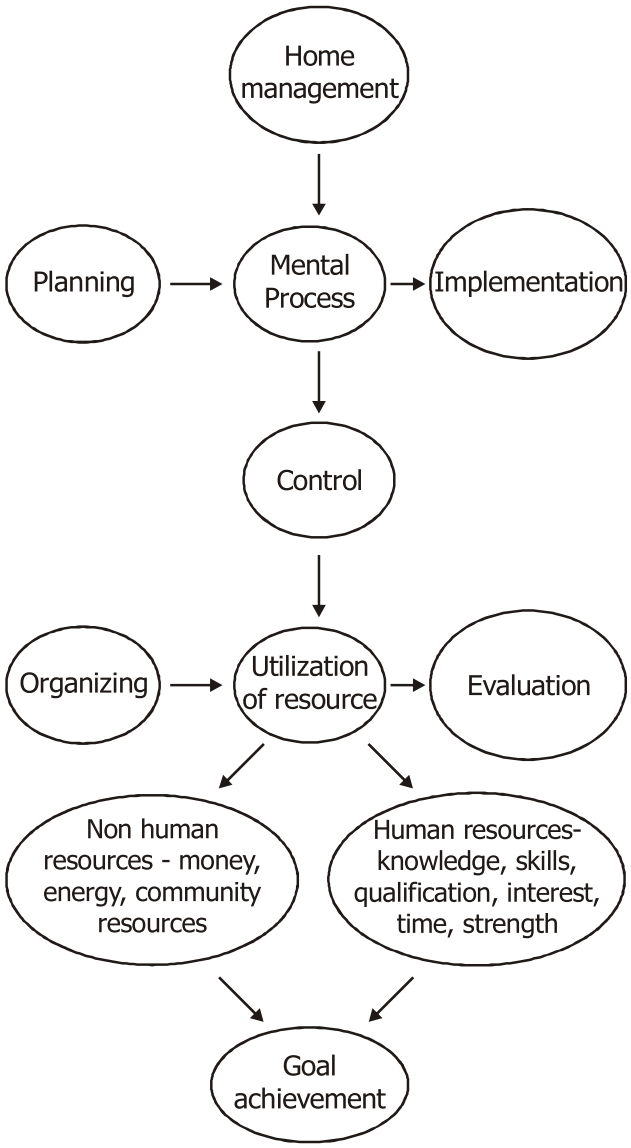
According to Nickel and Dorsey, "Home management is planning, controlling and evaluating the use of resources of the family for the purpose of attaining family goals."

Necessity of management– Man wants to complete all his activities in a skilled manner. To achieve his desired goals he uses various human and non-human resources. Because needs are unlimited but resources are limited therefore there arises a need to establish a balance by learning the art of management. In the absence of management achievement of goals and maximum utilization of resources becomes difficult. Limited resources have made management a necessity. The resources of petroleum are decreasing day by day but the demand for it is increasing. Therefore, we all must efficiently utilize petrol by using less it, and counsenrne it for longer time. For example, employees of an organization can carpool instead of going to the same place on different vehicles. In addition with the changing family life, home management has also been affected. Care of children in a nuclear family with a working mother poses a challenge. In such a situation a satisfied solution can be reached at only by the knowledge of management. For the management of modern homes, to decisions related to use of resources family support is essential. Success of any work depends on good management. Thus management is essential for achievement of every desired goal.

Process of home management– A chart explaining this is given below. For achieving any goal management is practised and its implementation is also importent. At the end, its success or failure is evaluated. For example, a homemaker decides to wash clothes. She has to undertake a number of processes to complete her goal– collecting the clothes, soaking clothes in water, rubbing, squeezing, out water from clothes, etc.

Home management

Figure : 24.2 Process of home management



Steps of home management process– for efficient living, home management is an essential aspect of family life. It is a changing and mental process which goes on continuously. Following are the steps of home management–

1. Planning
2. Organizing
3. Implementing
4. Controlling
5. Evaluation

1. Planning– Planning is the basis of a successful management. We all plan our daily activities. For example a teacher makes a plan for teaching; a homemaker makes a plan for household chores. Results of a good planning are always good. Work without planning leads to waste of time and energy. By planning we should decide on efficient utilization of resources to achieve our goals.

According to Nickel and Dorsey, 'to think of all the possible ways of reaching the desired aim, to imagine, to follow every plan and to choose a comprehensive plan is management.

In simple words we can say, we have to decide what we want to do? When we want to do? How we want to do? What type of resources do are need to complete the work ?

Management is a mental process because we need intelligence to do it; every work has to be in order while planning. That is why it has been linked with science. Detailed Planning is done alway before starting the work.

Characteristics of planning:

1. Planning is a continuous and an automatic mental process.
2. Planning should be real from the point of available resources.
3. Planning should be done in such a way that it fulfills the needs of all members or of the group.
4. In planning every member should work according to his own merit.
5. Planning should be flexible so that required changes may be carried out easily.

2. Organizing– Organizing means organization of all the aspects related to our planning. Like all the human and non human resources that we will use should be organized. The number of family members who will participate in it, what will be their roles, should be decided. Bringing all the members together, explaining them their responsibilities so that a co-ordination is established in their activities and also they experience interest in the plan and understand its importance.

For example, if responsibilities are not given to a particular person and only group discussion is done then it is possible that arrangements for the assinment remains undon. I have will he dupliation of work.

Organization gives the correct leadership. Delegation of work makes everybody realize their responsibilities. Work is completed on time and burden does not fall on a single person. Organizing gets completed after planning and before implementation. Organizing makes implementation easier because organizing is a way of simplifying things.

3. **Implementation**– When planning is done then it is implemented. In this step, person works according to the plan or the person collects all the resources and organizes them and all the members begin work as per the plan.

4. **Controlling**– While implementing a plan, it must be checked that the objective for which the planning was done gets fulfilled. If the objectives of planning are fulfilled it is known as activity control. Without control, planning does not bear results because imaginative planning and real planning becomes different and if control is not done then planning does not get real with as the available resources. While controlling if there arises a need to change the plan, it should be done right away by revieng and taking a right decision. That is, as per necessity, planning has to be modified because sometimes situation changes or planning turns out faulty. Thus, changes in planning become essential.

5. **Evaluation**– Evaluation is the last step in the process of home management. In this step the planning and its control are revealed assets to which has been done. For future planning, evaluation is very helpful. Evaluation is a very important instrument of management. Evaluation should be done from time to time so that we identify the faults and strong points of our plan and making necessary changes while making future plans. Evaluation introduces us to the successful and non-successful parts of our plan and helps us to rethink. Evaluation makes it clear whether we are going in the right direction for achieving the desired goal or not.

IMPORTANT POINTS:

1. For achieving life goals efficient use of resources is important.
2. There are two types of resources– human and non-human.
3. All the resources are limited and their uses, time, necessity, place can be different.
4. Management is an art which establishes a relation between the desired goals, resources and mode of work.
5. In home management, decision making is an important aspect. Decision is a mental process of choosing the best from all the available options.
6. For an efficient home management planning, organizing, implementation, controlling and evaluation are important. These are inter-related and inter-dependent.

EXERCISE

1. Choose the correct option–

(i) Knowledge is ——— resource

(a) Chemical (b) Physical

(c) Economic (d) Human

(ii) Management is a ———— process which goes on continuously

(a) Mental (b) Physical

(c) Economic (d) Social

(iii) Which type of value is economic benefit ?

(a) Personal (b) Social

(c) Internal (d) External

(iv) Which of the following resources once lost cannot be gained back?

(a) Money (b) Strength

(c) Time (d) None of these

2. What is a resource?

3. Define home management.

4. Explain the types of family resources.

5. Explain in detail the home management process.

ANSWERS:

(i) d (ii) a (iii) d (iv) c

CHAPTER : 25

TIME AND ENERGY MANAGEMENT

Time and energy are essential but limited resources of human life. Both these resources are required for doing every day work. Time and energy have a strong inter-relationship. Utilization and organization of one resource affects the other one. Therefore, humans must make a prudent utilization of both the resources for achieving the desired goals.

Time

Time is a priceless treasure of human life. This is the most useful and limited resource. Every day we have 24 hours. We have to do many things in this limited time hence we must properly utilize our time. Time management means organizing time in such a way that we achieve all goals of our family as well as personal.

Management

To make our lives successful, meaningful and prosperous we must utilize our time. For this we should divide 24 hours into 3 parts- 8 hours for our work, 8 hours for rest and sleep and 8 hours for ourselves that includes our leisure activities. To operate these 3 parts successfully time management is necessary. Good management of time gives complete energy and capability to finish a work and also gives utmost satisfaction, on the other side mismanaged time leads to stress and tension. A person who completes work on time gets time for rest and is always happy and healthy. On the contrary, the person who does not utilize time, his work does not get completed and he is always tired and stressed. Thus, time management is very essential.

The steps of time management are–

1. Organization of time– Planning should be such that time and energy both are saved.
2. A homemaker should maintain a balance between work, rest and entertainment while making a plan.
3. Some works are to be done daily, some every week, some every month and some are done once or twice a year. Therefore, work must be completed on priority basis. Some works have to be done at a particular time. e.g.- School, office time, lunch, dinner time, etc. if these works are done on time then others too fall in line.
4. While planning time, interests, needs, work habits of family members should be kept in mind as well as holidays should be taken care of.
5. Planning should be done for doing two-three works samultaneously.
6. Time should be assigned for all works. e.g.- if

you take half an hour to reach your office or school from home then you should keep exactly half an hour for travel and not less than that otherwise your planning will be faulty.

7. Planning should be flexible to accommodate any changes from time to time.
8. Planning should include all types of work like seasonal, yearly, personal, etc.
9. Some works get completed before the time scheduled time, the remaining time can be utilized for doing some pleasure like, watching TV or reading magazines.

2. Controlling of time planning– Success of a plan depends on its implementation. While planning, itself solutions for all possible problems should be anticipated. So that the daily work do not pose any difficulty. If difficulty persist, immediately new decisions should be taken to complete the work. If time falls short then-

1. Work should be completed on priority basis.
2. Speed of doing work should be increased.
3. Free time should be properly utilized.
4. Work can be completed with the help of other family members.

3. Evaluation of time planning– For the success of a plan, control is essential. Evaluation of work after completion is also essential. We can find out while evaluating that if work is completed or not? How practical the plan was? Whether the objective of plan was fulfilled or not? What were the shortcomings of the plan?

In this way, a successful planning is one in which available resources are efficiently utilized and personal, and family goals are achieved.

Energy

We need energy for doing all types of work. Energy is our capacity to do work. Working capacity of every individual is different. The amount of energy a person spends in doing a work depends on his physical structure and mental ability.

Energy management means doing work comfortably so that dullness is not experienced. A homemaker has to do household chores as well as some works outside the house. The energy for doing both these works differ. For example, chopping vegetables require less energy than climbing stairs. Schwartz has classified energy required for doing the work on the basis of drudgery of work–

S. No.	Work description	Percentage of energy spent more than the resting stage (kcal)
1	Light work	Less than 100
2	Normal heavy work	100 to 150
3	Heavy work	150 to 200
4	More heavy work	200 to 300
5	Excessive heavy work	More than 300

Energy is measured in calories. It is believed that man spends 100kcal during resting stage and less than 100 kcal for doing light work. He needs additional 100 to 300 kcal for doing heavy work. By using following equation we can find out energy spent (in kcal) for doing a particular work–

Amount of energy spent = total energy spent for work – energy spent while resting

Light work – 150 kcal – 100 kcal = 50 kcal

Excessive heavy – 450 kcal – 100 kcal = 350 kcal

Fatigue

Fatigue is experienced after doing every type of work. Fatigue is a condition when physical and mental energy is reduced and in the end a person cannot work at all.

Types of fatigue

Fatigue or weariness is of two types–

1. Physical fatigue
2. Mental fatigue

1. **Physical fatigue–** Continuous work reduce energy which affects the capacity of the body to perform function. This is because energy is consumed in doing work. We get this energy from food. Glucose in body gets oxidized to release carbon dioxide, water and energy. If sufficient oxygen is present in the body then glucose is completely oxidized and the person does not feel tired. But, if enough oxygen is not present then glucose is not oxidized completely and instead forms lactic acid. This lactic acid gets stored in muscles and fatigue occurs. In between this if the person takes rest then oxygen gets available sufficiently and oxidation reaction takes place converting lactic acid into carbon dioxide and water. Body gets the energy to perform work.

2. **Mental fatigue–** When a person has to do some work continuously, then he loses interest in the work and he no longer feels attracted towards that work, monotony is experienced, this state is known as mental fatigue. This fatigue causes dissatisfaction, indifference, depression and the urge to leave work is experienced.

Mental fatigue is experienced when working environment is not proper, goals are not achieved, when the right method of doing work is not known in such a situation, a person feels irritated and annoyed.

Ways of reducing fatigue–

1. Taking rest between work reduces physical fatigue. After resting, energy and enthusiasm is rejuvinated for doing work.
2. Mental fatigue can be removed by :

(i) Developing interest in work

(ii) Making simple goals.

(iii) Giving motivation for doing work

(iv) Developing skills for work

(v) Keeping right physical posture while working

(vi) Making working place a happy one

(vii) Taking out some time for rest

IMPORTANT POINTS:

1. Time is a priceless and is a limited resource. By utilizing time well we can achieve our desired goals.
2. Energy is required for doing work and we get that energy from food.
3. While managing time and energy, interest, working capacity, knowledge and habits of family members should be kept in mind.
4. While making a plan, light and heavy work should be balanced and period for rest should also be accommodated.
5. A homemaker should delegate work in such a way that she gets time for rest as well as for entertainment.
6. Fatigue is of two types–

(i) Physical fatigue

(ii) Mental fatigue

EXERCISE :

1. Choose the correct option–

(i) ———— is the second resource which is managed along with energy.

(a) Money

(b) Appliances

(c) Time

(d) Intelligence

(ii) What should be kept in mind while making a time plan?

(a) Priority of work

(b) Interests, habits and knowledge of family members

(c) Flexibility of plan

(d) All of the above

(iii) Reason of mental fatigue

(a) Headache

(b) Physical energy depletes

(c) Indifference and disinterest towards work

(d) All of the above

(iv) Main reason of physical fatigue

(a) Carbon dioxide (b) Glucose

(c) Water (d) Lactic acid

2. Write short notes on-

(i) Physical fatigue (ii) Resting period

3. What is fatigue? Write the types of fatigue.

4. Explain the main steps of time management.

5. How has Schwartz classified energy required for doing the work on the basis of drudgery of work?

6. Throw light on ways of reducing fatigue.

ANSWERS :

(i) c (ii) d (iii) c (iv) d

CHAPTER : 26
TIME AND ENERGY SAVING EQUIPMENT

Modernization and changing times have empowered women. Empowerment depends on time and working capability, and the way in which time and energy is carried out in simple, easy and convenient manner. Industrial revolution has given many tools which have made work easy and has saved time and energy. These tools are known as time and energy saving tools. These tools and appliances are more prevalent in developed countries than in developing countries. The demand of these appliances is less in developing countries because of following reasons: (1) high cost of tools, (2) homemaker not having sufficient information of these tools (3) rural environment and illiteracy.

Need of tools:

1. To increase capacity to work
2. To improve the quality of work
3. To make proper use of time and energy
4. To make work easy and simple
5. To create an environment of happiness, satisfaction and pleasure at home
6. To achieve good health

New inventions have made work easy, simple and convenient.

The tools that help make daily activities easy are–

1. Pressure cooker, 2. Microwave, 3. Gas stove, 4. Roti maker, 5. Electric heater, 6. Electric tandoor, 7. Electric toaster, 8. Hand blender, 9. Electric oven, 10. Dishwasher, 11. Refrigerator, 12. Washing machine, 13. Cooking range, 14. Solar cooker, 15. Mixer, 16. Vacuum cleaner, 17. Cooler, etc.

1. Pressure cooker–

This is an appliance in which food is cooked at high temperature and pressure. Cooking in pressure cooker takes 53% less time and 55% less consumption of fuel than in open pot.

Principle– Cooking food at high temperature and pressure.

Construction– A pressure cooker has following parts–

(i) **Main body–** This is a pot shaped structure made of aluminium, steel or mixed metals and coated material.

(ii) **Lid/ cover**– The lid is made of same metal as the body. There is an insulated handle attached to the lid. Lid is made in such a manner that it shuts the cooker tightly from inside and outside. There is a groove for fixing a rubber gasket on the lid.

(iii) **Vent tube**– It is present in the center of cooker's lid. It removes the excess steam from inside the cooker.

(iv) **Safety valve–** It prevents cooker from bursting. If food is cooked with the valve it

gets off less water than this valve melts but does not let the cooker burst.

(v) **Rubber gasket–** A rubber gasket is put in the space on the periphery of lid. It helps in proper closing of lid.

(vi) **Vent wet–** It controls the pressure on the vent tube.

(vii) **Net–** It is a net with large holes from which steam passes. While cooking many items in cooker together it is placed at the bottom of the cooker and water is put before placing the food pots.

(viii) **Pots for making food–** For making more than one food item, metallic pots of different sizes which fit in cooker are used.

(ix) **Handle–** It is used for placing and removing the cooker on gas. One part of it is attached to the lid and the other to the pot. When the cooker is closed, the two parts together make the handle.

To save time and energy right choice of tools is important. The tool should be chosen according to our requirements so that it can be used rightfully and taken care of. Knowledge of tool and its working should be possessed. Then only the tool will be useful.

2. Solar cooker

Solar cooker is aluminium made box and is operated with the help of solar energy. There are two types of lids on this cooker. A transparent glass is placed on the first cover. The upper large lid is made of aluminium from outside and inside of it a simple glass is present. This lid can be fixed at various angles using a clip. This lid is placed at an angle where it receives direct sun rays and the rays fall directly on glass of second lid. The inner walls of box made of aluminium are black coloured. 4 aluminium boxes are placed in this big box. Different food items are placed in these small boxes. These boxes are also black coloured from outside. Black color absorbs 100% steam. Four wheels are placed at the bottom of the solar cooker for moving it from one place to another. This cooker does not require fuel or electricity for cooking food. Environment does not get polluted and there are no risks of fire, gas or electricity accidents.

3. Refrigerator–

Refrigerator is the most useful appliance in the kitchen. Temperature in this is very low compared to the external environment. As a result food does not get spoiled and can be stored for a long time in a safe manner.

Principle- Refrigerator works on the principle of vaporization. In the refrigerator, Freon gas is filled in metal tube at 27.7^0 F boiling point. This gas takes heat from food materials at very low temperatures and get vaporized. This lowers the temperature of food and food does not get spoiled.

Construction– This appliance looks like a cupboard. It has following parts–

(i) Cabinet– A sheet of steel is present which is heat resistant.

(ii) Door– Like the cabinet this too is made of steel. This can also be made heat resistant. On the four sides of door on the outside rubber gasket is present.

(iii) Freezer– This is made of aluminium and is present as the above cabinet at 0^0C temperature. It freezes ice, ice cream, etc.

(iv) Chill tray– It is a plastic tray at the bottom of refrigerator to collect the water when freezer is de-freezed.

(v) Shelf– It is rod shaped shelf made of metal. Different items are kept on shelves.

(vi) Crisper– This is a rectangular box at the bottom of fridge. It is covered with a thick glass cover.

It is used for storing vegetables and fruits.

(vii) **Place for eggs–** It is a plastic tray on the inside of door.

(viii) **Place for keeping butter–** This is also present on the inside of door.

(ix) **Place for bottles–** This is a stand-like structure present on the inside of door.

(x) **Bulb–** In the cabinet, below freezer a bulb is present. It lights when fridge is opened and gets automatically off when door is closed.

(xi) **Regulator–** It is present exactly below motor cabinet. Generally open but sometimes it is present as a closed machine.

The food items to be kept in the refrigerator should not be less than room temperature. Food items should be kept covered. Door of fridge should not be opened again and again. Do not let excess of ice to freeze in freezer, place food items at their place only. Immediately clean any spilled water, milk or anything liquid. All the above mentioned things are important for proper working of refrigerator.

4. (A) Vacuum cleaner

With the help of vacuum cleaner, every corner of house, floor, carpet, and sofa can be cleaned in less time and with less energy.

Principle– In this atmospheric pressure pushes air towards low pressure area which creates vacuum. Consequently dirt, dust etc are pulled inside machine and gets collected in a bag.

Types of vacuum cleaner–

1. Electricity operated simple vacuum cleaner
2. Automatic vacuum cleaner

On the basis of position of collecting bag in the vacuum cleaner, it can be of two types–

(1) External collecting bag vacuum cleaner

(2) Closed bag vacuum cleaner

Construction– (1) External collecting bag vacuum cleaner

(i) **Main part–** It is made of chromium, rubber is present on all the four sides. This part is known as body. Wheels are present at the bottom part. These wheels help in moving the cleaner from one place to another.

(ii) **Bag–** This has minute holes to collect the dirt and dust particles.

(iii) **Fan–** A fan is present below motor for creating vacuum.

(iv) **Handle–** It is made of metal with a plastic or rubber knob.

(v) **Bottleneck–** It is attached with cleaner.

(vi) **Electrical wires and plug–** Wires and plug are attached with cleaner to supply electricity from the electrical board to the cleaner.

(vii) **Switch–** A switch is present at the bottom of cleaner which is regulated with the foot.

4. (B) Closed bag vacuum cleaner–

(i) **Body–** It is made of rust free metal which is enamel polished. Wheels and switch are present at the bottom of the body which is regulated with motor.

(ii) **Motor–** Motor is present for regulating fan.

(iii) **Suction head–** It has a cover made of rust free metal. A hole in the middle of the cover lets the air pass out.

(iv) **Vacuum head–** A holed cover is present on this head from which air passes out.

(v) **Bag–** It is made of thick, strong cloth in which dirt gets collected.

(vi) **Tube–** One part of it is attached with suction head and other with a brush and pump.

(vii) **Whisk–** It is useful for cleaning carpets, floor and sofa.

(viii) **Pump–** Insecticide is sprayed with it while cleaning.

(ix) **Cleaning bag–** It contains disinfectants. Disinfectant is sprayed using pump.

(x) **Electrical wires and plug–** Electrical wires and plug are present to supply electricity from electricity/ switch board.

How to use– Connect the electrical switch to the switch board. Switch on the whisk and pump to clean the required area. Switch off the plug when cleaning is done and clean the dirt from bag. Keep the vacuum cleaner at a safe place.

5. Mixer

It is an electrical appliance which performs many functions. Kneading dough, grinding dry/wet spices, crushing food material, grinding lentils, onion, garlic to make a paste, making potato chips, making juice of fruits etc can be done with mixer. All this can be done to save time and energy.

Construction– It has the following parts–

(i) **Motor–** It is present at the lower part of the appliance which helps in turning the rod or shaft. Speed of motor can be increased or decreased.

(ii) **Grinder–** It is bowl-shaped made of plastic or Bakelite. The inside is made of steel and has sharp moving blades with a plastic lid. Dry/ wet spices, lentils can be grinded in it.

(iii) **Jar–** It is glass-shaped, transparent and is made of steel or plastic. It is covered with a lid and has sharp blades at the bottom. It is used for making milkshake, buttermilk, etc.

All the above mentioned parts work using electricity. Regulator works to start and stop the machine and regulates the speed of motor.

While using mixer it should be taken care that the jar or grinder is filled up to ¾ parts. Motor should not be used above the rating time limit. Use mixer once and then give a rest of 15-20 seconds before using it again. Mixer should be cleaned properly after use.

EXERCISE–

1. Choose the correct option–

(i) Need for time and energy saving appliances
(a) For increasing working capacity
(b) For economic achievement
(c) For fashion and urbanization
(d) None of these

(ii) The principle of pressure cooker is
(a) Cooking food at high temperature and pressure
(b) Cooking tasty food
(c) Cooking food using solar radiation
(d) Cooking food at low pressure

(iii) Food does not get spoiled in refrigerator because of
(a) High temperature (b) Low temperature
(c) Vacuum (d) Pressure

2. Fill in the blanks–

(i) Solar cooker is made of ———— metal.

(ii) Refrigerator works with the help ————

(iii) House ————can be done in less time and with less energy using vacuum cleaner.

3. List the appliances with thair use which save time and energy.

4. Write the principle for working of pressure cooker.

5. Write about the use of refrigerator.

6. What do you know about solar cooker?

7. Write the construction and the method of use of mixer.

8. Write about a vacuum cleaner.

9. Explain the principle and construction of refrigerator.

ANSWERS:

1. (i) a (ii) a (iii) b

2. (i) aluminium (ii) electricity (iii) cleaning

CHAPTER : 27

HOUSEHOLD ACTIVITIES, SPACE MANAGEMENT AND DECORATION

One of the basic necessities of man is a home. Home is a place where a family lives or home is a residence suiting the comfort, safety, privacy, health and interests of family. Home is a place where every family member develops his human qualities and feels safe. For a good house, following points should be kept in mind:

1. Home should be suitable from the point of view of health or it should be airy and well lit.
2. Home should have adequate space for daily activities of every member to provide comfort.

Home activities–

Every household has house hold chores like cooking food, eating food, bathing, washing clothes, care of children, studying, collection of things, hospitality, etc. All these activities are fulfilled in the home. Where there is enough space, each activity is carried out in a different room. If the space is smaller, then all the activities have to be adjusted in the same room. For example, kitchen can be used for studying also; bedroom can be used as common place for studying and sitting as well.

Every home should be planned in such a way that space can be allocated for each activity. If the home is big enough then no problem arises. But if the home is small compared to the requirements then problem arises. If the home is small then good homemaker can make efficient use of space for meeting all the needs. Therefore, howsoever the home is, if space is not allocated for activities of all family members then it create discontent among the members. While dividing home for various activities, following points should be kept in mind–

1. Space allocation should provide maximum comfort to members
2. Every space in the house should be used efficiently.

There are many factors that affect the space allocation in a home. Some factors are- number of family members, available goods, available space, age and interests of members, economic level, etc.

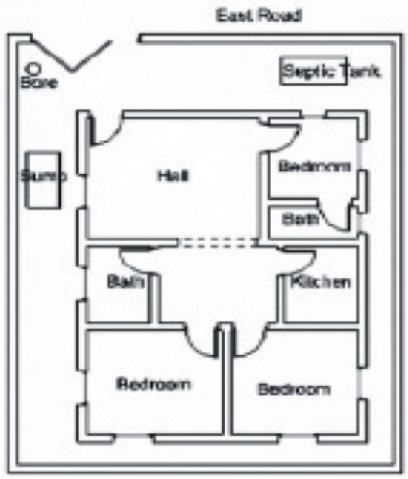


Figure : 27.1 (space arrangement)

But it should be taken care that space is

allocated for the important activities like- kitchen, toilet, bathroom, sleeping room. In addition to this an efficient homemaker can utilize space like courtyard, hallway and gallery for multiple use.

While accomplishing various activities following points for space management should be kept in mind–

1. Drawing room or living room.
2. Bed room
3. Dining area
4. Kitchen
5. Bathroom
6. Guest room
7. Children's room
8. Store room
9. Verandah

1. **Drawing room or reception room**– Every home whether big or small should have a drawing room. It should be well utilized and well maintained. It should be airy and well lit. Other than receiving guests, family can use it as common room on holidays or for entertainment.

Living room is the place where all the family members can sit together and enjoy, except these stitching, knitting, chopping vegetables, etc can be done in this place. This place has one more advantage that presence of guests in this room does not affect the privacy. This room can also be used as dining area.

2. **Bedroom**– This is the room where family members can rest at day or night. This place should be safe, calm and adequate for resting. This room should be away from drawing room or noise. If the bedroom is big enough then small sofas can be placed which can be used for guests when needed. Sometimes activities like painting, playing, studying can also be carried out.

3. **Dining room**– Modern families do not like to eat in kitchen. Therefore, they have separate dining area. Dining room should always be near the kitchen. If kitchen is big then small area in it can be converted into dining area. If space in kitchen is less then courtyard near the kitchen can be used as dining area.

4. **Kitchen**– It is the most important room in the home because the level of family and its health depends on this area. Maximum time of a homemaker is spent in this room. In modern times when homemaker has also started working outside, the kitchen needs to be properly managed and equipped with modern appliances. Therefore, work simplification should be taken care of. In homes where separate area is not available for kitchen, then small space in room or in courtyard is arranged for cooking. However the kitchen should be always clean and tidy. There should be adequate space for cooking and keeping food items.

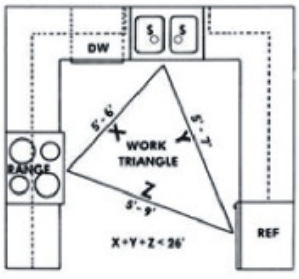


Figure : 27.2
(work simplification)

5. **Bathroom**– The right place for bathroom is near the bedroom. The bathroom should be

well lit and airy. These days a toilet is also attached with bathroom. If the bathroom is big it can be used as a dressing room also.

6. **Guest room**– If the home is big then a guest room is also arranged. It is located in one of the corners of the home so that it does not disturb privacy of the family. Guest room can be used as a study room also.
7. **Children's room**– Every home should have a separate room for children because children are those members of the family who need most love and safety. The furniture in children's room should be of less height, simple and light which can be used by children for studying, playing and painting. Such a place should always be kept for children which they feel that it belong to their. This room can be a small in area in the courtyard or in the bedroom. Children can carry out their activities in this place.
8. **Store room**– Boxes, suitcases, extra beds, etc are kept in the store room. This room should be near the bedroom. This is useful as well as safe near bedroom. In modern homes, a store room is arranged in every room to store things related to that particular room.
9. **Verandah–** A verandah can be present on all the four sides of the home or in front and back of the home. The front verandah can be used for guests also. Other people like milkman, hawker or a strange person can also be made to sit in the verandah who otherwise cannot be invited inside the house. The backyard is often used by homemaker for her household chores or by children for playing.

While doing space management, keep the following points in mind–

1. **Inter relation of rooms**– This is like dining room should be near kitchen so that food can be served easily.
2. **Traffic**– The passafe near room should be open for easy walking. There should be no obstacles causing botheneck
3. **Seclusion**– Between two rooms to maintain seclusion, the location of doors and windows should be properly designed taken care. The inside of room should not be visible from outside. For example, instead of locating door in the center of the room place it the corner.
4. **Maximum use of space**– Space in room or in home should be used as much as possible.
5. **Furniture management**– Every room should have suitable furniture. If space is less than multi-purpose furniture should be used like sofa-cum- bed which can be used as sofa in day and as bed at night.

Wherever possible, space management should be such that the worker can perform two- three activities together. Like there should be hall near kitchen in which homemaker can watch TV, can take care of food placed on gas and help children with their homework.

Use of colours and decorative materials in home decoration– In modern context, home decoration does not mean making home a decorative piece but it means making home well equipped the things that increase productivity and comfort. Home decoration is a an art which gives new look to the home and is a reflection of personality of all the family members.

According to Sunder Raj, internal decoration is a creative art which can transform even a simple

house.

The elements essential for home decoration should be known so that different items in the home can be used comfortable and in a beautiful many. The elements of art are– (1) Line, (2) Shape, (3) Construction, (4) Colour, (5) Light, (6) Location.

Colors

Color is an important element of art which can be used for making home attractive and beautiful. To add beauty to different places and things, colour should be used according to the location, time and situation. The main source of colour is light. According to Prang, there are three qualities of a colour–

1. Hue– That is the name of color, example- red, green, blue.
2. Value– That is the lightness or darkness of color, example- light green and dark green.
3. Chroma– That is brightness or dullness, example- blood red, faded red.

Prang's colour wheel– Prang has given a color cycle. On the left side hot colors are placed while on the right side cool colours are present. Red and yellow are hot colours because these are colours of fire and sun. Blue and green are cool colours because these are colours of water and grass.

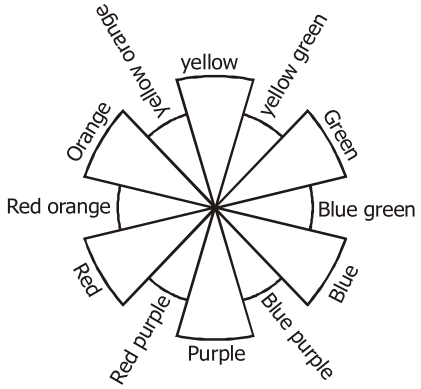


Figure : 27.3
Prang's Colour Wheel

Classification of colours– Colours are divided into 3 types– Primary colours, Secondary colors and tertiary colors.

1. Primary colours– These are primary colours which are found in natural state. These are not obtained from any other color. Examples are red, blue and yellow.
2. Secondary colours– These colors are obtained by mixing two primary colours in right proportion. Examples are orange, violet and green.
3. Tertiary colours– When a primary color is mixed with a nearby secondary colour then we obtain a tertiary colour. Examples are red-orange, red-violet, yellow-orange, yellow-green, etc.

Apart from these colours black, white, grey and brown colours are also found which can be used in different ways to make home attractive. These colors are known as neutral colors. According to Prang, the things colored with hot colors look big in size and appear to be nearer. Whereas things colored in cool colours look small. Just like black and white are complementary, in the same hot and cool colours are complementary to each other.

Color scheme–

Colors have a special influence on our lives. Therefore, colours should be used carefully. Colour scheme is of two types–

Color scheme			
Associated color scheme		Contrast color scheme	
Monochrome scheme	Adjacent color scheme	Contrast color scheme	Segmented color scheme

In addition to these, tri-color scheme and quadrangular colour scheme is also used.

Monochrome scheme– In this scheme, a single colour is sued for home decoration. But value of that colour is changed using black and white colors in different proportions. Similarly, Chroma can also be varied. Examples are green, light green, dark green, bright green and dull green.

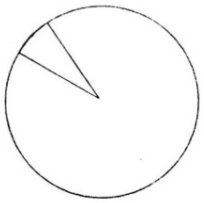


Figure : 27.4
Monochrome scheme

Adjacent colour scheme– In this scheme, colour is used according to Prang's colour scheme in which any colour and two colours near to it are used. Example- if yellow is the main color then yellow-green and yellow-orange can be used.

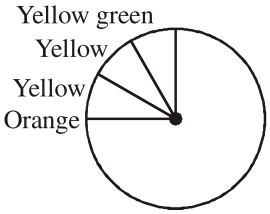


Figure : 27.5
Adjacent color scheme

Contrast colour scheme– In contrast colour scheme, opposite colours in the colour whed are coordinated. Examples are red and green, blue and orange. If two contrast colours are used then it is known as bi-color scheme. Examples are red- green, blue-orange.

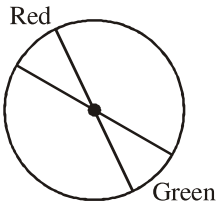


Figure : 27.6
Contrast color scheme

Segmented contrast color scheme– In this scheme, instead of color opposite to the main color, the colour adjacent to the opposite colour is used. Examples are yellow- red, violet-blue.

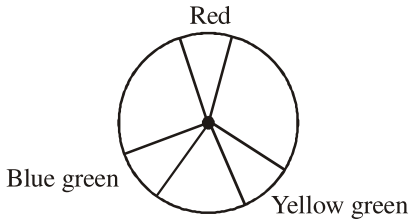


Figure : 27.7
Segmented contrast color scheme

Tri-color scheme– Using any three equally spaced colours in the color scheme is known as tri-colour scheme. Examples are three primary colors– red, blue, and yellow.

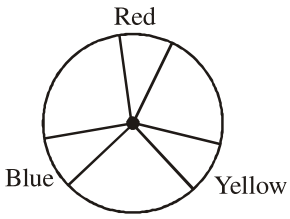


Figure : 27.8
Tri-color scheme

Quadrangular color scheme– When four colours equally spaced in the colour scheme are used it is known as quadrangular colour scheme. Examples are yellow, orange, green, blue, violet, and red; or yellow, green, blue, violet and orange.

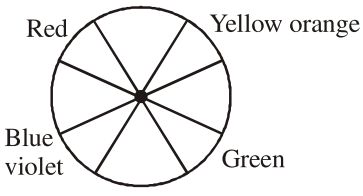


Figure : 27.9
Quadrangular color scheme

Classification of colours on the basis of mental effects–

1. **Hot and cool colours**– The relation to nature is the basis of these colours. Red, yellow and orange are considered hot colours because these are colours of fire and sun. Blue colour is of sky, green is of plants and so they give us the cooling effect.

2. **Heavy and light colors**– Some colours give the effect of heaviness like black, brown and red while some give a light effect like blue, pink and white. Therefore, heavy colours or dark colours should be used on floor while light colours should be used on ceiling and walls.

3. **Advancing colors and receding colors**– The colors which emerge and leave more of their effect are known as advancing colours while colours which appear far away are known as receding colours. Generally hot colours are advancing colours and cool colors are receding colors.

Precautions while using colors are–

1. Colours should be used according to interests of person or a family. Some people like multi-purpose scheme while some like plain white.
2. The quantity of colour to be used is of utmost importance. Example- bright violet colour can look beautiful if used in small place but not on all walls. Blue colour in large space will look attractive but red colour in large space will look tiring.
3. Colours should be used according to the objective of room. Example- bedroom is room for rest, so calm colors should be used. Children like bright and dark colours, therefore multi-colours can be used in their room.
4. Colours should be used according to size of the room. Example- using light colours in small room makes it look big while dark colours make it look small.
5. In cold climate spaces hot colours look good while in hot climate cool colours look good.
6. Same color looks different on different surfaces like red, yellow and orange look bright on satin, silk but dull on hand-spun, jute and cotton clothes.
7. Contrast colours make each other look dark. Example- when black and white are used together then black will be seen more black and white appears more white. Using any other colour with black will not make black more black.
8. Colours can be used according to fashion also. Example– earlier only white tiles and wash basin were used in bathroom. Nowadays they are available in different colors. The color which is mostly in fashion is used.

Decorative items– For interior decoration of home many decorative items are needed. But mere presence of decorative things cannot make home beautiful but items have to be properly arranged to make house look beautiful. These items provide completeness and feasibility to interior decoration and also increase artistic value. Examples are photo frames, sculptures, lamps, clocks, plants, etc.

Following are types of decorative items–

1. **Artistic and aesthetic items**– The items of which main purpose is to increase aesthetic value are known as artistic and aesthetic items. Examples are artistic pictures, sculptures, flower- decoration, artistic mirror, etc.

2. **Functional and useful items**– These items are of aesthetic value and also are useful like lamps,

clocks, ash tray, etc.

3. **Natural items**– These items are related to nature. These can be used as such or can be modified. Examples- plants, aquarium, fans, fountains, shells, dry leaves, etc.

Following points should be kept in mind for home decoration–

1. Decorative item should be placed at appropriate location in house according to the item's nature. Example– clock should be hung on a wall. Do not hang war pictures in bedroom.
2. Too many decorative items make the space crowded. Therefore they should be decorated either in groups or classified before decoration.
3. Functional items should be fully used. Examples clock should always work, lamp should give proper light, etc.
4. Items should be such that they can be changed according to fashion.
5. Decorative items should be useful for the decorative style. Example– in traditional style of decoration folk art items and historical items will look good while in modern style, modern items like 3-D, electric fountains will look perfect and attractive.

Thus, not only proper use of decorative items is enough but also their timely care is important.

IMPORTANT POINTS–

1. Home is a place where a family lives and where every family member develops his human qualities.
2. A person does many activities in his home and so requires proper space for doing work.
3. Home decoration makes home look beautiful, attractive and comfortable. A homemaker can give different looks to the home as per her likes.
4. Colour is an important element of home-decoration which helps in making home attractive.
5. Colours used in home decoration affects our attitude.
6. Colours should be used according to objectives of the room.
7. Many decorative items are used in home decoration like sculptures, pictures, lamp, clocks, etc.

EXERCISE :

1. Choose the correct options–

(i) Kitchen is ——— type of space
(a) Useful (b) Useless
(c) Secluded (d) None of these

(ii) Name of color is known as
(a) Colour (b) Primary colour
(c) Hue (d) Value

(iii) ——— is a hot colour.
(a) Green (b) Blue
(c) White (d) Yellow

(iv) Red, blue and yellow are ——— colours
(a) Secondary (b) Tertiary
(c) Primary (d) Contrast

2. Write in short–

(i) Primary colours

(ii) Functional items for home decoration

3. Why is home decoration useful?

4. How should colours be used for home decoration?

5. Explain different colour schemes with examples.

6. What precautions should be taken while using colours?

ANSWERS

(i) b (ii) c (iii) d (iv) c

CHAPTER : 28

FIRST-AID

Definition and meaning– The aid given to an injured person before the arrival of doctor or before he reaches a hospital is known as first aid. This aid is given at the place of accident or somewhere near it.

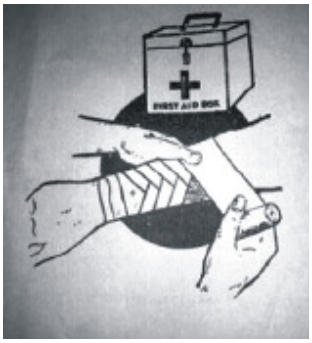


Figure : 28.1 (First Aid)

Objectives of first aid–

1. Protection of life – The main objective is to protect the life of the injured. If first aid is given at proper time then it becomes possible to save the life of an injured person.
2. Immediate aid– First aid is given immediately after the accident so that the condition of patient does not worsen and becomes serious.

Principles of first aid– First aid is the care that is given only at the place of accident. Any person can give first aid. Once the injured person reaches the hospital, responsibility of the person giving first aid gets fulfilled. A good primary physician should follow the given principles–

1. Dispersing the spectators.
2. Checking the condition of injured
3. Start the breathing activity of the injured
4. Loosen the clothing of injured
5. Observing nervous and respiratory activity
6. Stop blood oozing from any part of the body
7. To stay calm and think clearly
8. Immediately taking the patient to a doctor
9. Taking immediate decisions

Responsibilities of the primary physician–

1. **Arranging for a doctor–** The main responsibility of the primary physician is to collect the complete information of the accident and convey the same to the doctor by sending responsible person. This is because the doctor arriving at the accident place comes with complete preparation and could start immediate treatment.
2. **Laying the injured on a proper ground–** Lay down the injured person on a proper ground protecting him from sunlight, etc and also dispersing away the curious crowd.
3. **Giving artificial breathing**– If the injured is

not breathing, the person giving first aid should immediately start artificial breathing to the injured.

4. **Making the injured person vomit**– In case of poisoning accident, primary physician should try make the person to vomit.
5. **Fracture**– In case the primary physician suspects a fracture, he should take care not to move that particular part.
6. **Aid for a drowned person**– When a person drowns in water, his stomach gets filled with water therefore first slush or mud should be removed from his mouth and then he should be turned around to vomit water from his stomach.
7. **Protecting injured from extremes of weather**– Injured person should also be protected from weather. In summers, protection from sun can be done by laying the person in a cool and well airy place and in case of winters, blankets or quilt should be arranged for him for keeping his body warm. When the injured gains consciousness, he should be given hot or cool drink.

Characteristics of primary physician–

Primary physician should have following characteristics–

1. **Confidence**– A primary physician should have self confidence. If somebody creates hurdles in his way he should do his work with full confidence.
2. **Immediate decision making**– A primary physician should take complete note of the situation and then should take immediate decision for the care of the injured.
3. **Knowledge of physical structure**– He should have knowledge about physical structure of the human body so that he can easily understand the part where injury has occurred, to know place from where blood is oozing out, to know fractured part and to judge whether artificial breathing is required or not.
4. **Use of available resources**– He should have the knowledge to utilize the resources available at the accident place so that his condition should not worsen.
5. **Patience–** Because everybody gets scared during an accident. Therefore howsoever the patient scared, the primary physician should keep patience and provide support to the injured so that he gains some emotional strength.
6. **Compassionate**– A person compassionate towards others can only give help. Therefore, the person giving help to injured people should be compassionate and should show sympathy towards them.
7. **Mild-mannered**– Primary physician should be mild mannered and cheerful so that he could instill confidence in the injured person.
8. **Healthy**– The person providing first aid should himself be healthy and powerful so that he is able to lift the injured person if required. He should be able to provide help skillfully and successfully.
9. **Devoted to duty**– He should give the first aid thinking it to be his duty. He should fulfill his responsibility and not concerned with caste or religion.

General domestic accidents and treatment–

1. **Burn**– Mainly burn is of three types– 1. Simple burn (2) Special burn (3) Odd burn

1. **Simple burn**– In this the skin turns red but

no blisters.

Treatment– On such burnt area water should be immediately poured. Raw potato should be crushed and applied. Lime water should be mixed with coconut oil or sesame oil to be applied on the burnt area.

2. **Special burn**– In this type of burn skin turns red and blisters appear.

Treatment–

1. Blisters should not be punctured.
2. Apply burnol on the wound
3. Sticky substances like oil, ghee should not be applied on blisters.

3. Odd burn– In this type of burn, fibers of the part affected burn. This causes immense pain and irritation.

Treatment–

1. Immediately rush to the doctor
2. Affected part should be washed with cold water
3. Burnol should be applied

Sun stroke–

In summers, hot weather and blowing loo can cause sun stroke. Staying for long in hot areas or uncovered head in summers can cause sun stroke.

Symptoms–

1. Normal sun stroke causes headache, dizziness and sometimes vomiting.
2. Thirst increases, breathing and pulse increases.
3. Person may become unconscious or suffer from high fever, hot and dry skin in case of strong sun stroke.
4. Body temperature increases to 105^0C. If efforts are not made to reduce temperature, it may result in death of the patient.

Treatment–

1. Lay down the patient in a cool place and remove the clothing.
2. Put an ice pack on patient's head and wrap the patient in wet cloth and provide fan at high speed.
3. As the temperature decreases, wrap the patient in dry sheets.
4. Give salted water to the patient for drinking.
5. To prevent sun stroke, give salted water of raw mango.

Electric shock–

Sometimes due to negligence or fault in electrical appliance may cause electric shock. If the person is not removed away from the electrical wire, he may die.

Symptoms– Body parts often get burnt due to electric shock. When electric current touches hands and arms it may flow towards chest and reach heart thus weakening it.

Treatment–

1. Switch off the electric current supply or remove the plug.
2. Remove the affected person away from the electric wire. Do not touch the affected person with bare hands. Dry wood, dry clothes, dry rope or rubber gloves should be used for touching the affected person. Wear rubber slippers or stand on a pile of wood or newspapers while touching the shocked person.
3. Give artificial breathing to the patient if he is not breathing.
4. Rub the feet of shocked person so that blood flow starts.

5. When the person gains consciousness give him hot tea to drink.

Foreign bodies in ears, eyes and nose–

1. **Foreign bodies in ears**– Often while playing, seeds, beads or wheat grains enter the ears of children. Sometimes mosquitoes or other insects too may enter.

Symptoms–

1. When an insect enters the ears, ear drum and head experiences pain.
2. Ear swells up and the external ear turns red.

Treatment–

If an insect has entered ears, do the following–

1. Put few drops of glycerin, mustard or olive oil in the ear.
2. In oil put 2-3 ounce of warm water.
3. Sometimes focussing the light from a torch in the ear also removes the insect.

If some other foreign body has entered ears then–

1. Put mustard oil.
2. If no relief comes from the above treatment, consult a doctor.

2. **Foreign body in eyes**– Often sand, dust particles or insects or eyelashes may fall into the eyes. Eye is an important and soft organ of the body. Therefore, treatment should be done immediately.

Symptoms– Irritation and pain in eyes. Eyes turn red and watery. Sometimes eyes swell too.

Treatment–

1. First of all, eyes should not be rubbed. Rubbing causes friction on soft skin of eyes.
2. Pull down the lower eyelid to see any small particles and rub them off with a soft cloth or use wet cotton to clean the eye softly.
3. If the eyelids have stuck together, try opening and closing eye by dipping it in water.
4. If lime or phenyl falls into the eyes, wash the eyes with clean water and immediately see a doctor.
5. Put a drop of castor oil or olive oil in the eye. Foreign body comes out with tears from the eye.

Foreign bodies in nose– Often grams, peas, pearls or other things enter the nose of children while playing. Due to sheath in nose, wheat grain in the nose swells and gets stuck.

Symptoms–

1. Difficulty in breathing.
2. Swelling on nose
3. Pain in nose
4. Nose turns red

Treatment–

1. Sniffing tobacco causes immediate sneezing and the foreign body comes out.
2. Close one hole of nose and forceful exhalation from the other removes the irritant.
3. Do not put tweezers or water in the nose. This causes the irritants to move up in the nose.
4. Immediately see a doctor if this treatment does not work.

IMPORTANT POINTS:

1. The aid given to an injured person before the arrival of doctor or before he reaches a hospital is known as first aid
2. The main objective is to protect the life of injured
3. Primary physician giving first aid should be

confident, decision maker, patient, sympathetic and sincere.

4. Burn is of three types– Simple, special and odd.
5. In case of sun stroke lay down the person in a cool place.
6. Do not touch electric current with bare hands.
7. While doing electricity related work wear rubber slippers or rubber gloves in hand.
8. Do not use tweezers to remove the foreign body from ears or nose.

EXERCISE:

1. Choose the correct option:

(i) The best quality of a primary physician is

(a) Foresight (b) Work efficiency

(c) Active (d) All of the above

(ii) First aid is given ———— after an accident.

(a) Long term (b) Purposelessly

(c) Immediately (d) Short term

(iii) Objective of first aid is

(a) Saving life of the injured person

(b) Giving condolence to injured person

(c) Preventing worsening of condition of the injured person

(d) all of the above

(iv) Which type of burn reddens the skin but no blisters appear?

(a) Simple burn (b) special burn

(c) Odd burn (d) none of these

2. What is first aid?
3. Why should first aid be given?
4. What are the characteristics of an ideal primary physician?
5. What treatment should be given for sun stroke?
6. What treatment will you give if a foreign body enters into someone's nose and eyes?

ANSWERS:

(i) d (ii) c (iii) d (iv) a

CHAPTER : 29

HOME NURSING

Diseases and accidents have become common these days. Someone or the other falls ill in the family now and then. A home can anytime become a hospital. In such a situation if we know how to take care of the patient we may help in easy recovery.

Home care of the patient is as important and necessary as the care of the doctor. Taking right care and doing service to the patient is of utmost importance for his recovery. Medicines and other treatments are decided by the doctors but constant daily care of the patient, timely medicines, proper food, are taken care of by family members. Taking patient to toilet, bathing, changing his clothes, making him sit, are also works that need to be done.

Figure : 29.1 (Home Care)

Therefore, all the care and facilities that are given to the patient at home is known as home care. Every girl and boy should have basic knowledge of home care. This knowledge helps in caring for the disease of the patient at the primary stage. It is often seen that in the absence of proper care the desease of the patient aggravates. It is not possible that patient is taken care only in hospital, home care is also essential for him. Patient can be given satisfactory care at home. At home, patient feels safe and comfortable. He doesn't fear and his condition gets good. Thus, the satisfactory and comfortable environment of home contributes in patient's well being.

Characteristics of the attendant–

1. **Correct knowledge**– He or she should have proper knowledge of body science and of sterilizing agents so that proper care could be taken of the patient.
2. **Capable of decision making**– If the condition of the patient worsens suddenly, he should be calm and maintain his mental balance for decision making.
3. **Knowledge of first aid**– He should know how to take body temperature, pulse, tying band-aid, etc. Also should have knowledge about how to change sheets of patient's bed, cleaning his body using sponge, making his chart, etc.

4. **Power to over view–** He or she should have power to overview patients' condition, effect of medicines on him, etc to report to a doctor.
5. **Psychological–** Attendant should have knowledge of psychology so that he/she may be able to understand the behavior of patient and give him sympathy and strength psychologically. Also he/she should be able to give medicines to the patient cajolingly.
6. **Polite and cheerful–** Patient often gets irritable therefore the attendant should behave politely and cheerfully. This helps the patient to recover fast.
7. **Good health–** Attendant should be healthy himself. Only a healthy attendant can take care of a patient.
8. **Dutiful–** He should be interested in service. He will need patience and diligence to take care of the patient. Often these qualities are found in women. They have a serving attitude since childhood. Home and hospitals often have female attendants though men too play as attendants.

Duties of an attendant–

An attendant plays an important role in the recovery of a patient from illness. He plays the connecting role between a doctor and a patient. He needs to perform following functions while taking care of patient–

1. **Room management–** A patient stays in the room day and night. Therefore, keeping the room proper is the responsibility of the attendant. If the room is, comfortable and facility-rich, then patient will recover fast. Therefore, patients' room should be clean, airy and well lit.
2. **Hygiene of patient–** The patient has to be taken to the toilet at regular intervals, washing his face, changing his clothes, combing his hair; works are done by the attendant.
3. **Food of the patient–** Attendant should have culinary skills too so that he/ she may give proper food to the patient.
4. **Protection of patients from infection–** If patient is suffering from infectious disease attendant should take care that the infection does not transmit. He should wash patient's utensils and clothes with a sterilizing agent.
5. **Description of diseases–** Attendant needs to prepare full description of every stage of patient's illness. Examples- time of medicine, amount of medicine, etc.
6. **Following advice–** Attendant should follow the advice given by the doctor honestly and rightfully. He should inform the doctor fully about patient's condition.
7. **Inspiring–** Attendant should not let the patient get depressed and try to reduce his worries and fear.

While performing the above functions, attendant should take care of his own health too. He should wash his hands with any antiself solution soap or after doing every work of the patient. Attendant should wear light and comfortable clothes and should take good sleep to remain cheerful and active. Thus, having a proper home care gives immense relief to the patient.

IMPORTANT POINTS:

1. Home care is the care and facility given to the patient at home.
2. Home care of the patient is as much important and necessary as the care of the doctor.

3. Attendant should be healthy, knowledgeable, cheerful and of serving attitude.
4. Attendant plays the connecting role between doctor and patient.
5. Attendant should maintain hygiene of patient's room, clothes, utensils, etc.

EXERCISE:

1. Choose the correct option:

(i) Work of an attendant is

(a) Bathing of patient

(b) Giving medicines to patient

(c) Giving full information of patient to doctor

(d) All of these

(ii) ——— can work as an attendant

(a) Woman (b) Man

(c) Children (d) Anyone

(iii) Attendant should not be

(a) Obedient (b) Soft-spoken

(c) Lazy (d) Cheerful

(iv) ——— is not the work of an attendant

(a) Cleaning body of the patient

(b) Arranging food of patient

(c) Room management

(d) Treating the patient

(v) Attendant has to follow orders of

(a) Doctor (b) patient

(c) Householder (d) all of these

2. Explain the meaning of home care.
3. Why is the psychological knowledge necessary for attendant?
4. Why is an attendant known as the connecting link between patient and doctor?
5. Write four qualities of an attendant.
6. What are the duties of an attendant? Explain.

ANSWERS:

(i) d (ii) d (iii) c (iv) d (v) a

UNIT : VI
CURRENT LIFE STYLE AND YOGA

CHAPTER : 30
IMPORTANCE OF YOGA

Yoga is a glorious part of our ancient culture because of which India has been the teacher of the would for centuries. Yoga is an accessible and natural pratice which results in healthy body and mind and many other spiritual benefits.

The word 'Yoga' comes from sanskrit root word 'yuj' which means 'to link', that is to link body, mind and soul into one. In the famous text '*Patanjali*' is written–

"योगस्य चित्तवृति निरोधः"

This means control on mind's disposition is yoga

In the *Bhagvad Gita* it is written, "योगः कर्मसु कौ□ालम" That is skillness in work is yoga.

In today's fast life many moments arise which brings our life to a standstill. There are many factors around us which raise tension, weariness and irritation in our life which unsettles us. Thus for keeping life healthy and energetic yoga is panacea which brings peace to the mind and keeps body disease-free. Yoga gives a harmony to life's pace.

Yoga normalizes the blood circulation in the body and it is the principle of body science that contraction and relaxation of body creates new energy in the body and body gets rid of many diseases. Various postures of yoga fulfill this purpose. Postures and *Pranayam* makes the body disease-free. Yoga makes the digestive system healthy which makes the whole body healthy and active. While performing yoga involving nose and lungs fresh air enters the lungs which keep the lungs healthy. Yoga makes the body healthy, beautiful and fit. Yoga postures make the excretory system perfect and it works properly which eliminates the undigested food from the body and protects the body from diseases.

With the development of civilization humans have created many problems. The cause of mental unhealthiness is man's own attitude and values due to materialism. Consequently, competition in every walk of life, attachment to rights and the unending race to earn money can be seen everywhere. Yoga is essential for attaining mental health. Parasympathetic nervous system gets active because of yoga. Self-analysis, peaceful mind, self- solution and self- enhancement can be achieved through yoga. Yoga positively affects voluntary nervous system, respiratory system, endocrine glands spiral cord and digestive system. The balance achieved through yoga helps controlling feelings like envy jealousy, anger, fear, etc.

CHAPTER : 31

IMPACT OF YOGA ON PHYSICAL AND MENTAL HEALTH

1. Yoga has been used as a source of attaining physical, mental and spiritual gains. Many research works have proved that yoga is a blessing for man's physical and mental well-being.
2. In gym, exercise is focused on a particular part of the body while in yoga every organ and organelle gets involved and the whole body starts working properly.
3. Yoga increases the working capacity of immune system which increases resistance to diseases. One can feel young even in the old age. Skin glows and body becomes healthy, disease-free and strong.
4. Yoga provides muscularity which makes even a thin body person strong and powerful and also lessens the body fat of an obese person. Yoga is useful for all types of body.
5. Everyday yoga is a good exercise for the muscles which removes tension and the person sleeps well, gets good appetite and digestion remains perfect.
6. *Pranayam* and meditation are also good for the body along with yoga. *Pranayam* helps in controlling the speed of inhalation and exhalation. *Pranayam* is useful for asthma, allergy, sinusitis, old cold, cough, and it also increases the oxygen inhaling capacity of the lungs which provides proper oxygen to the body cells and have positive effect on the body.
7. Meditation is an important part of yoga. These days meditation is gaining popularity in our country as well in foreign countries. The materialistic culture, work pressure, doubt in relationships, etc have increased a lot. In such situations, meditation is the best remedy. Meditation reduces mental tension, increases internal peace and working capacity and induces good sleep. Mind concentration and focus increases.
8. Yoga reduces sugar levels in the blood and this reduces L.D.L. or bad cholesterol in the body. Yoga is very beneficial for diabetes patients.
9. Some yoga postures and meditation are useful for arthritis, back pain, etc and this reduces requirement of medicine.
10. Yoga increases resistance power of the body and reduces dependency on medicines. Many researchers have proved yoga useful for asthma, high blood pressure and type-2 diabetes.
11. Yoga removes depression from a person's mind and this reduces criminal mentality.

In short, we can say that yoga is not just a physical activity or disease removing activity but it is a way of making life better. World Yoga Day is celebrated on 21st June all over the world to popularize the importance of yoga.

CHAPTER : 32

IMPORTANT YOGASANA

Yoga is an ancient Indian way of life which links our body, mind and soul. The best quality of yogasana is that they are naturally adaptable and accessible to all. Yogasana is a way of exercise in which no special expenses are required and also not many material is required. Rich-poor, young-old, weak-strong, men-women, all can do yogasana. Yogasana involves both muscle contracting, pulling exercises and also has relaxing exercises which reduces the weariness of body and the energy spent in doing yogasana is regained. Mind and body are rejuvenated. From a spiritual sense yoga has a different importance. The present lifestyle requires not only a fit body but also a strong mind and for this food alone is not enough. Yogasana can also help in making body fit and mind strong.

1. Surya Namaskar (Sun Salutation):

The most effective and beneficial of all yogasana is the Surya Namaskar. It is the initial step for yogasana and pranayama. The essence of all yogasana is hidden in the Surya Namaskar.

Figure : 32.1 (Surya Namaskar 12 steps)

Benefits:

- Surya Namaskar is a complete exercise. It makes all the parts of the body strong and disease-free.
- It makes abdomen, intestines, stomach, heart and lungs healthy and strong.
- It makes spinal cord and waist flexible giving relief from all diseases.
- It makes blood circulation smooth and keeps blood pressure under control.
- It provides mental strength.

- Surya Namaskar gives Vitamin D which makes bones strong.
- Eyesight improves
- It helps in reducing weight

How to do 'Surya Namaskar' –

12 steps of Surya Namaskar -

1. Stand erect and raise both the hands, keeping them in level with the shoulders. Bring palms together and downwords in front of the chest in prayer position.
2. While breathing in, lift the arms up and stretch them, taking the arms backwords and keep them close to the ears. Stretch the back, neck in such a way that the upper body tilts backwords. This is known as ;Ardhchakrasana'. This whole process gets completed while breathing in.
3. Slowly release the breath and bend forward. Bring the hands, neck down to the floor and touch the floor beside the feet. Stay in this position for some time. This is also known as 'Paad paschinottarasan; or 'Paad Hastasan'.
4. Keep the hands touching on the floor, inside and push your right leg back. Push the chest forward and life the neck up. The foot should be erect during this position.
5. Exhale slowly and take the left foot. Such that heels of both the feet are together. Stretch the body backwards keeping the feet together, bend the neck downwards.
6. Inhale, keep hands and feet stable and make chest and knees touch the the floor. In this way, both hands, feet, knees, chest and head are touching the floor. This is known as 'Shashtangasan'. Lift the things a little and exhale.
7. In this position, inhale slowly, stretch the chest forward and bring the hands in straight position. Push the neck back. Make sure that knees touch the floor and feet are erect. This is known as 'Bhujangasan.'
8. Make the posture same as in step-5 and bring the chin near the throat touching it. Look at the feet.
9. Now make the posture same as in step-4 and fake the left leg backwards and right leg forward.
10. Make the posture same as in step-3 and bring the left leg forward to form 'Paschimottanasan' position.
11. Stay in step_1 posture, inhale and take the hands upwards. Stay in this position and stretch arms, back and neck backwards.
12. This is same as step-1 posture, that is, prayer position.

2. Trikonasana (Triangle Pose)

'Tri' means three. Therefore this yogasana means three angles or a triangle. (fig. 32.2)

Benefits:

- It provides strength to the muscles.
- It provides relief to patients of constipation
- It helps in reducing fat of waist and buttocks.
- It is helpful in increasing digestion power.

How to do Trikonasana–

1. Stand straight. Separate your feet comfortably

wide apart (about 3-1/2 to 4 feet).

2. Turn your right foot out 90 degrees. Touch your right feet with your right hand allowing your left hand to come up in the air. Keep both arms in straight line. This is the main posture of this yogasana.

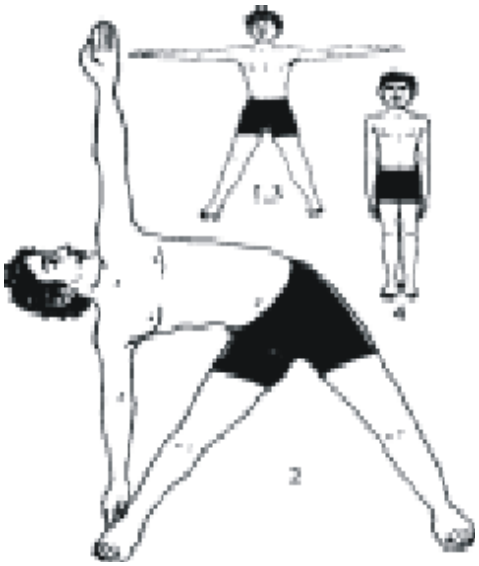


Figure : 32.2
Trikonasana Method

3. Stay in this position for 15-20 seconds and then stand straight. Repeat the same on the other side.

Important points:

Do not bend the knees and elbows. While bending one must make sure not to bend forward but sideways. While bending right or left exhale and while coming back to straight inhale. While in the main posture of the yogasana breathing speed is normal.

3. Padmasana (Lotus Position)

In Sanskrit, *padma* means Lotus. This is why padmasana is also known as lotus position. For meditation this position is very important. This helps concentrating the mind. Concentration of mind is important in this yogasana. (fig. 32.2)

Figure : 32.3
Padmasana (Lotus Position)

Benefits :

- This yogasana circulates blood from the legs to other body parts as well which increases the activity of the body.
- It releases tension helping mind to concentrate and increase positivity.
- It makes legs and chest strong.
- Regular practice helps maintain stomach flat.

How to do Padmasana :

1. Sit on the floor with legs stretched out in front of you while keeping the spine erect. This is 'Dandasan position.'
2. Hold the thumb of right foot and bend the knee to bring the right leg on the top of the left thigh.
3. Hold the thumb of left foot and bend the knee to bring the left leg on the top of the right thigh.
4. Both knees should touch the floor and both feet should face upwards. keep the spiral cord,

neck and head in a straight line

5. Keep the palms on the knees or keep one palm on another in the lap. Close eyes and inhale deeply and make the breathing rate normal.
6. Hold the left foot with the right hand and stretch the leg. Now, hold the right foot with the left hand and stretch the leg. Come back to 'Dandasan' position.

4. Makarasana (The Crocodile Pose)

Makarasana is one of the yogasana which requires lying down on one's stomach. The body in the last stage of this yogasana looks like that of a crocodile. This yogasana helps in relaxation. (fig 32.4)

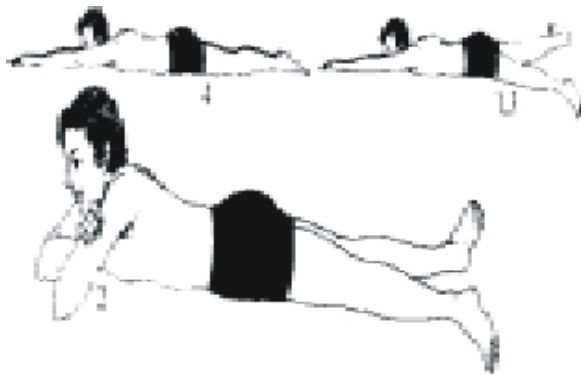


Figure : 32.4 (Makarasana)

Benefits:

- It relaxes all the muscles of the body.
- Blood circulation becomes smooth. This makes the person healthy and disease-free.
- It increases activity of intestines which relieves constipation.
- Lungs expand in this yogasana; as a result more air goes into the body. This is helpful for asthma patients.

How to do Makrasan:

1. Lie down on the floor on the stomach and open the legs as per comfort. Keep the feet in such a way that toes point outwards and ankles point inwards.
2. Fold the right hand and place the right palm on the left shoulder and place the left palm on right shoulder. Lift the chest a little upwards fo that breathing remains normal. Chin should rest on the melting area of both the hands.
3. Remove the left palm from the right shoulder and stretch the hands in front of the head. Then remove the right palm from the left shoulder and come back to the first posture.
4. Bring the legs together and come back to original position.

5. Vakrasana (Twisted Pose)

Vakrasana involves sitting. *Vakra* is a Sanskrit word which means twisted. But spinal cord in this yogasana is straight and the whole body is twisted. (fig 32.5)

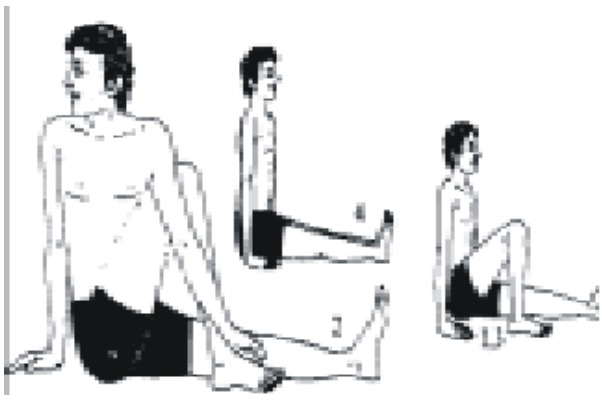


Figure : 32.5 (Vakrasana)

Benefits:

- This yogasana affects liver, kidneys, and pancreas and makes them disease free.
- It strengthens the spinal cord
- Patients of hernia are benefitted by this yogasana.

How to do Vakrasana:

1. Sit down on the ground stretching the legs forward. Keep the hands on side. Keep the spine straight and eyes should look in front. Bend the right knee and place the right foot beside the left knee.
2. Press the body towards the right and the lift the left hand, exhale, twist to the right knee and hold the right ankle with the left hand. Repeat the aasana from the other side.
3. Inhale and keep left hand on the ground beside the left thigh.
4. Straight the right leg and keep it aside left leg and come back to the original position.

IMPORTANT POINTS:

1. Yoga is a natural way of life which provides healthy mind and body and other spiritual benefits too.
2. Yoga is derived from Sanskrit 'Yug' word which means 'to link'.
3. Linking mind, body and soul together is known as yoga.
4. *Patanjali* describes yoga as control on mind's disposition.
5. Yoga helps in keeping body healthy and disease free.
6. Yogasana makes body healthy, beautiful and fit.
7. Yoga increase the working capacity of immune system which increses the capacity to fight diseases.
8. Yoga releases mental stress and gives a peaceful mind.
9. World Yoga Day is celebrated on 21st June to popularize the importance of Yoga.
10. Surya Namaskar is the most effective and beneficial of all yogasana. It is an initial step which is the essence of all the yogasana.
11. Surya Namaskar has 12 steps.
12. In Trikonasana, body takes the position like a triangle.
13. For meditation Padmasana is important.
14. Makrasana involves lying down on one's stomach. The body in the last stage of this yogasana looks like that of a crocodile.
15. In Vakrasana, spinal cord is straight but rest of the body is twisted.
16. Yoga is not only a physical exercise to reduce disease but also a way of making life better.

EXERCISE:

1. What is the meaning of the word 'yoga'?
2. What is the importance of yoga in today's lifestyle?
3. Explain the effects of yoga on physical health.
4. Explain the effects of yoga on mental health.
5. Write the benefits of Surya Namaskar.
6. Write the method of Trikonasana.
7. What are the benefits of Makrasana.
8. Write about the usefulness of Vakrasana.
9. What are the benefits of Padmasana.
10. Write the method of Padmasana.
11. How many steps are there in Surya Namaskar?

UNIT : II
HUMAN DEVELOPMENT AND FAMILY RELATIONS

CHAPTER : 1
PREPARING IMMUNIZATION SCHEDULE

National Immunization Schedule

Name of vaccine	Age
B.C.G.	At the time of birth/ within 1 year
Hepatitis B (Birth Dose)	At the time of birth/ within 24 hours of birth
Polio (O Dose) (OPV) (Oral Polio Vaccine)	At the time of birth/ within 15 days of birth
Polio (OPV) respectively I,II,III	1-1/2 months, 2-1/2 months, 3-1/2 months
D.P.T. (OPV) respectively I,II,III	1-1/2 months, 2-1/2 months, 3-1/2 months
Measles I	Within 9-12 months of birth
Vitamin- A (I Dose)	Within 9-12 months of birth
D.P.T. Booster-I	Within 16-24 months of birth
Polio Dose Booster (OPV)	Within 16-24 months of birth
Measles II	Within 16-24 months of birth
Vitamin A (II to IX Dose)	One dose after each 6 months starting from the first dose till the age 5 years
D.P.T. Booster II	Within 5-6 years
Pregnant ladies (16-34 weeks)	TT-I or Booster injection
After one month of TT-I	TT-2 (If the pregnant lady was administered 2 vaccines in the last 3 years then only booster injection is sufficient)

Note: 1. There should be a gap of at least 1 month between two doses.

2. Vaccination should be done even if suffering with mild fever, cough or cold.

CHAPTER : 2

INTERVIEWS OF WORKING WOMEN VISITS TO CRECHE, BALWADI, AAGANWADI AND NURSERY SCHOOLS AND PRESENTATION OF REPORTS

1. Name : _____
2. Age : _____
3. Caste : _____
4. Educational Qualification : _____
5. Married : Yes/No

   If yes then number of children : _____
6. Type of family –

   • Nuclear family • Joint family
7. Area of living–

   • Rural area • Urban area
8. Occupation–

   • Government • Private

   • Self-employed • Others
9. Area of working–

   • Rural • Urban
10. Distance of workplace from home

    _____
11. Means of travelling to workplace

    _____
12. Duration of work

    _____
13. Experience of working –

    • Less than 2 years • 2 years

    • More than 2 years
14. Monthly Salary

    _____
15. How do you spend your monthly salary?

    • Savings • Education of children

    • others
16. Are you satisfied with your job? Yes/ No
17. How do you utilize your time after work?

    • Household Chores • Other Works
18. Do you participate in any training or other programmes? Yes/No
19. Have you ever recived any award at your workplace? Yes/No
20. Have you ever organized any training work at your level? Yes/No
21. Is your opinion relating to family sought in issues Yes/No

If yes, in which type of decisions your opinions are asked the most?

Objective:

1. Giving directions about proposed services and expanding the horizon of the services.
2. Helping students so that they learn and understand the theoretical aspect of education and service of boys.

3. Developing skills in students so that they may evaluate services of the boys.

Procedure:

Observe the welfare services of institutions for students, boys and fill in the questionnaire for information–

Table: 2.1

S.No.	Question	Answer
1	Name of the institution	
2	Address of the institution	
3	Date of visit	
4	Name of the principal	
5	Qualifications of principal	
6	Experience	
7	Training taken?	
8	Phone number	
9	Advisor	
10	Time of institution	
11	Institution – (a) Government (b) Semi-government (c) Private	
12	Total money	
13	(a) Government (b) Institution (c) organization (d) Employee (e) Others	
14	Type of service	
	(a) Educational (b) Practical	
	(c) Private and social (d) others (e) all of the above	
15	Objectives of institution	
	Age limit of children	
	Number of children on the basis of age	
16	Flow chart	

17. Qualifications of Employee

S. No.	Name	Post	Qualification	Age	Experience	Salary	Permanent/ Temporary

18. Method of selecting employees

(a) Personal interview

(b) Experience

(c) Qualification

(d) Training

(e) Others

19. Are your employees satisfied with the salary? Yes/No

20. Are employees coordinating with each other? Yes/No

21. Are employees satisfied with their work? Yes/ No

22. Furniture

(a) Sufficient

(b) Insufficient

23. Is there an open space? If yes, then area–

24. Are there separate rooms for?

(1) For givingg cousultation Yes/No

(2) Workers Yes/No

(3) Customers Yes/No

(4) Rest room Yes/No

(5) Other purpose Yes/No

25. Lavatory arrangement Yes/No

26. Fresh Water facility Yes/No

27. Are rooms provided with ventilators and are well lit? Yes/No

28. Library facility? Yes/No

29. Place of center–

(i) Easy to reach

(ii) Dilapidated condition

(iii) Others

30. Are there private provisions for the customer?
Yes/No

31. Are there steps of advice process in the center?
Yes/No

32. Procedure of problem solving

33. How do you maintain documents and registers?

34. How do you utilize the budget?

35. Operational methodology to increase different developmental working areas—

1. Physical working area
2. Dynamic working area
3. Social working area
4. Emotional working area
5. Cognitive working area
6. Language working area
7. Aesthetic working area

Write the description of any welfare institution that you have visited in this questionnaire and give your suggestions for improvements.

CHAPTER : 3

OBSERVATION OF CHILDREN (1-5 & 6-10 YEARS) IN THE VICIWITY AND PREPARATION OF REPORTS

Food nutrition and health have a very deep inter relationship. The modern lifestyle is moving that it so fast has ignored the subject of health and the result is that the youth is suffering from blood pressure, diabetes, heart ailments, obesity, arthritis, thyroid, etc. which earlier were diseases of adults and old age. The main reason behind this is the wrong habits of eating and living. According to World Health Organization, for good health absence of diseases is not enough but physical, mental and social health should also be good.

Following some healthy habits like eating a balanced diet, exercise, proper sleep, staying tension free and keeping addictions away can help in achieving a healthy life which in turn will enable us to keep our family healthy. This will create a healthy and strong society and country.

By this practical exercise you will inspect various anthropometry measures. First learn how to measure weight and length under the guidance of your teacher–

1. **Measuring height–**

Normally height is measured in two ways- measuring the height of whole body or of circumferences of head or chest. The height of every person is made of four parts– legs, buttocks, trunk and skull. To know the nutritional anthropometry of a person measuring complete height is essential.

Measuring height of a boy and adult:

1. The height of a boy or adult who can easily stand straight can be measured using a measuring tape of fiber glass or a stationary scale while he stands against the wall.

Figure : 3.1

Measuring height by steady scale

2. While measuring height the boy or the adult should stand barefoot on a plain surface against

a plain wall.

3. Before measuring length remove cap, clip from the head and open the ponytail and bun.
4. While measuring length make sure that the boy is not standing with a bent back or head or is standing on one foot.
5. Ankles, waist, shoulders, buttocks and head should touch the wall.
6. Use one hand to keep head and face still and other hand to measure length. When the measuring tape touches feet, record the length in centimeters.
7. If you are measuring length against a wall, then touch the scale on the head and mark the length on the wall. Now measure the length from the mark on the wall to the floor in centimeters.

Measuring height of a baby:

1. Make the baby lie down on a flat surface so that his head touches the wall and legs are opposite the wall.

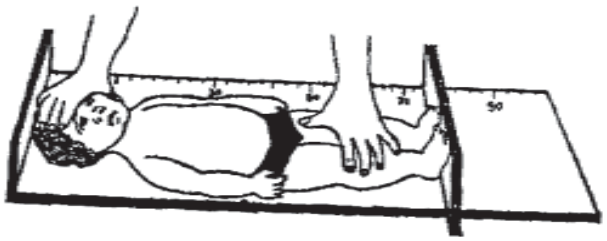


Figure : 3.2 (Measuring height of a baby)

2. Carefully hold the head and face of the baby and make him stable so that his eyes face the ceiling.
3. Gently press the knees to make his legs straight such that his feet point upwards.
4. Hold hardboard against the baby's feet and mark a line at this place on the ground.
5. Lift the baby up and now measure his length from the point on the ground to the wall using a measuring tape made of fiber glass (with breadth not less than 1 cm and it should not be flexible). Note the length in centimeters.

2. Measuring Weight:

Weight is the most used measurement. This helps in knowing nutritional levels. Not only can doctor know if the weight is increased or decreased but can also interpret other things.

Instruments to be used for measuring weight should be exact, easy and strong to use. It should not be very expensive. Weight is made up of muscles, fat and bones in the body.

Measuring weight of a boy or an adult:

1. Digital electronic balance can be used for measuring weight. Bring the machine to zero before weighing. One can check if the machine is working properly or not using standard weights. This is known as standardization of machine.
2. Before weighing it should be ensured that there is minimal clothing on the body. Also no ornaments should be worn during weighing.
3. Weighing should be done barefoot and equal weight should be put on both the legs. One should stand in the middle of the machine, keep head straight and hands parallel to the body.

Figure : 3.3
Digital electronic balance can be used for measuring weight

4. As the machine measures the weight, note down the weight in kilograms. In a spring balance minimum 100 grams and in a digital electronic balance minimum 250 grams can be weighed.

Measuring weight of a baby:

1. Weight of a baby can be measured using a beam scale. Also a Salter scale can be used.

Figure : 3.4
Baby Digital electronic balance for measuring weight

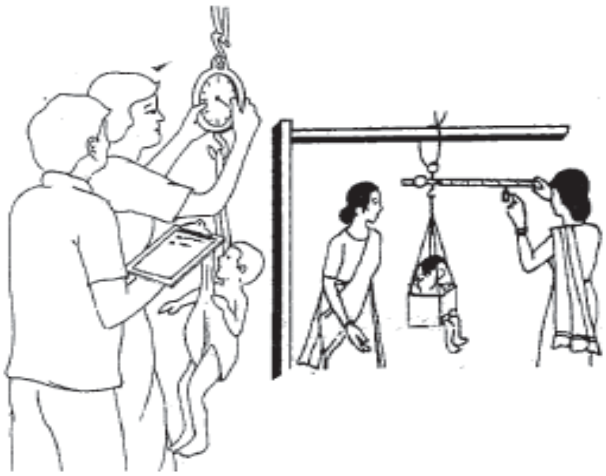


Figure : 3.5 (Weighing a Baby)

2. While weighing a baby it should be ensured that he has minimum clothing on his body.
3. If required, baby can be weighed while he is on mother's lap.
4. For this a platform beam scale is used.
5. In this case, weigh both mother and the baby together and note the result. (Weight 1)
6. Now weigh only the mother. (Weight 2)
7. Subtract the weight of weight 2 from weight 1 and the result will be baby's weight.

National Center for Health Sciences (NCHS) has prepared a table of weight and length of baby, boy and adult according to age and gender. One can compare their results with this table to monitor their health.

Table 3.1: Measurements of length and weight of children and adults by NCHS

Age (years)	Boys		Girls	
	Length (in cm)	Weight (in kg)	Length (in cm)	Weight (in kg)
0	50.5	3.3	49.9	3.2
¼ (3 m)	61.1	6	59.5	5.4
½ (6 m)	67.8	7.8	65.9	7.2
¾ (9 m)	72.3	9.2	70.4	8.6
1	76.1	10.2	74.3	9.5
1.5	82.4	11.5	80.9	10.8
2	85.6	12.3	84.5	11.8
3	94.9	14.6	93.9	14.1
4	102.9	16.7	101.6	16
5	109.9	18.7	108.4	17.7
6	116.1	20.7	114.6	19.5
7	121.7	22.9	120.6	21.8
8	127	25.3	126.4	24.8
9	132.2	28.1	132.2	28.5
10	137.5	31.4	138.3	32.5
11	143.3	35.3	144.8	37
12	149.7	39.8	151.5	41.5
13	156.5	45	157.1	46.1
14	163.1	50.8	160.4	50.3
15	169	56.7	161.8	53.7
16	173.5	62.1	162.4	55.9
17	176.2	66.3	163.1	56.7
18	176.8	68.9	163.7	56.6

Head Circumference:

1. Because of some ailments, the head circumference increases. Such ailments can be diagnosed by measuring the circumference of head. These are known as macrocephalic and microcephaly. These defects are present from birth and are because of infection or genetics.
2. In addition to this head circumference also helps in measurement of nutritional level and age.
3. Thus, head circumference is measured of children 1-8 years of age.
4. Head circumference depends on measure of brain and thickness of skull.
5. In the 2nd year the size of skull starts increasing. But this depends on nutrition level also. Thus the head circumference helps in knowing nutrition level and malnutrition.

Measuring head circumference–

A narrow (less than 1cm and inflexible) tape made of steel or glass fiber is used. While measuring, the head should be stable. Tape should be placed above the eyebrows and in a circle around the head.

Figure : 3.6 (Measuring Head Circumference)

Table 3.2: Measurement of head and chest of baby and boy according to age

Age (in months)	Head (in cm)	Chest (in cm)
Birth	35	35
3	40.4	40
6	43.4	44
12	46	47
18	47.4	48
24	49	50
36	50	52
48	50.5	53
60	50.8	55

Chest Circumference:

1. After 6 months of birth, development of head slows down and that of chest increases.
2. Thus, nutrition level can be known by measuring head/chest ratio.

Measuring chest circumference:

A narrow (less than 1cm and inflexible) tape made of steel or glass fiber is used. Measurement is taken while touching the tape to the breasts.

The ratio of head and chest of child above 6 months is measured to know the nutritional levels. If the ratio is less than 1 then the child is fairly nourished. If the ratio is more than 1 then the child is malnourished.

Body Mass Index (BMI)

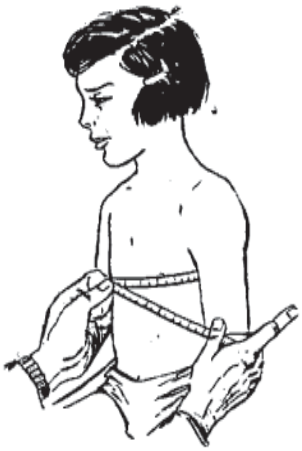


Figure : 3.7 (Measuring chest circumference)

The weight of an adult depends on two factors–

1. Length
2. Weight

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women. The simple formula to calculate BMI is—

under weight **Normal weight** **Over weight** **Obesity**

Figure : 3.8 Body Mass Index

BMI = Weight (in kg)/ (length)^2 (in cm)

1 kg = 2.5 pounds

1 feet = 30 cm

1 meter = 100 cm

1 inch = 2.5 cm

Measure your BMI and find out in which category it falls–

Less than 18.5	–	Less weight
18.5- 25	–	Normal weight
25- 29.9	–	Over weight
More than 30	–	Obesity

The benefits of a normal BMI—

- Less danger of diabetes
- Helpful in maintaining normal blood pressure
- Less chances of heart related problems

- Relief from joint pain
- Long and healthy life
- Right level of energy

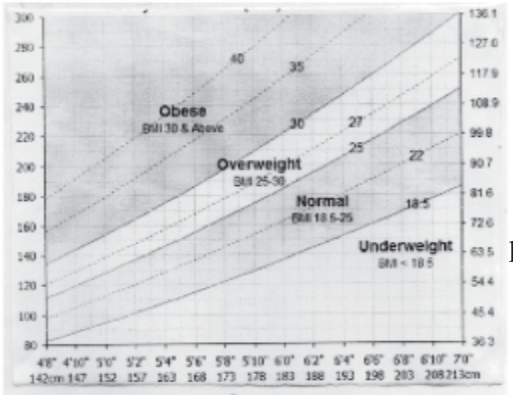


Figure : 3.9 (B.M.I. Chart)

Practical exercise

1. Measure the head and chest circumference of 0-1 years old baby and estimate the nutrition level–

S.No.	Head circumference	Chest circumference	Ratio	Conclusion
1				
2				
3				
4				
5				

2. Measure length and weight of 2-10 years old children and estimate the nutrition level-

S.No.	Length (in cm)	Weight (in kg)	Conclusion
1			
2			
3			
4			
5			

3. Calculate BMI and estimate nutrition level—

S.No.	Weight (in kg)	Length (in meter)	BMI	Conclusion

UNIT : III
FAMILY NUTRITION

CHAPTER : 4
PREPARING LOW COST, NUTRITIOUS RECIEPES AND ORGANIZING COMPETITIONS

The nutrition of food can be increased at home by germination, fermentation of food and by mixing various foods together. Germination of cereals increases levels of vitamin B1, B2, Niacin and vitamin C. Germination reduces the levels of toxic elements and converts some carbohydrates into sugar in the pulses. Fermentation of pulses reduces the amount of phytates and thus, the iron salt present becomes free which can be easily absorbed. Fermentation increases the taste, nutritional value and digestion of cereals. Mixing two or more food items together increases the nutrition and nutritional elements in the food. Examples are pulses-rice, pulses-wheat, khichdi, idli, stuffed bread, *pulao,* etc. three recipes are given below for preparing nutritious food–

1. Germinated *Moth-Bajra* Chat

Ingredients:

Moth beans	:	20 grams
Bajra	:	10 grams
Onion	:	1 (small)
Green chili	:	½
Tomato	:	1 (small)
Lemon juice	:	4-5 drops
Salt	:	To taste

Method:

1. Soak Moth and *bajra* in water overnight.
2. Put the soaked *bajra* in a thin cloth and hang it from a hook for germination.
3. Mix the germinated moth, *bajra*, chopped onions, tomato, chilli, lemon juice and salt together and serve.

2. Sweet *Mathri* :

Ingredients:

Bajra flour	:	50 grams
Moth flour	:	25 grams
Crushed roasted groundnuts	:	10 grams
Roasted sesame	:	5 grams
Oil	:	for frying

Method:

1. Mix *bajra* and moth flour together.
2. Add crushed groundnuts, sesame, some oil, jaggery or sugar and knead the dough.
3. Make small but thick *mathri* and fry them in oil at low flame till they turn light brown.

3. *Katori* Chat:

Ingredients:

Moth flour	:	20 grams
Bajra flour	:	15 grams
Wheat flour	:	10 grams
Oil	:	for frying
Onion	:	10 grams
Green chilli	:	½ chopped
Coriander	:	5 gram
Lemon juice	:	½ spoons
Salt	:	To taste

Method:

1. Add salt to the three flours and knead them into dough.
2. Place a thin chapatti of this flour outside a *katori* (bowl).
3. Fry this chapatti with the bowl in hot oil.
4. When the chapatti turns golden brown, separate it from the bowl.
5. Add germinated moth, onions, salt, chilli, coriander, tomatoes, lemon juice in this bowl, mix them well and serve.

4. ***Dhokla:***

Ingredients:

Bajra flour	:	50 grams
Moth flour	:	10 grams
Onion, ginger	:	small quantities
Green chilli, coriander	:	according to taste
Cumin seeds	:	a pinch
Salt	:	to taste
Curd	:	¼ cup
Oil	:	1 big spoon

Method:

1. Add salt to the flour.
2. Knead dough adding onion, green chilli, ginger, coriander, cumin and curd.
3. Make small balls of the dough and cook them for 20 minutes in steam.
4. Check the balls using a knife so that they do not stick. Remove them from flame.
5. Fry the steamed balls in little oil and serve them hot.

5. Idli:

Ingredients:

Rice	:	30 grams
Split black gram (*urad*)	:	10 grams
Salt	:	to taste
Oil	:	little

Method:

1. Separately soak gram and rice in water for 6-8 hours.
2. Grind the soaked rice and gram finely.
3. Mix the rice and grams together making a thick paste. Add salt and keep it under sun or covered overnight for fermentation.
4. Now apply some oil in idli making plate and put a spoon full of paste in the plate.
5. Place this idli plate in idli stand or in cooker filled with hot boiling water. Keep the plate above the level of water.
6. Cover the pot and let it cook for 10-15 minutes.
7. Remove the idli stand from flame and let the idli cool. Insert a knife in the idli, if the paste does not stick on knife idli is cooked.
8. Serve idli with Coconut chutney and Sambhar.

CHAPTER-5

PREPARING RECIPES USING DIFFERENT COOKING METHODS

Various types of dishes are made in our homes. Various methods of cooking are used to make these dishes. Some recipes made using various methods of cooking are given below as a sample:

1. **Boiling -** With this method, we make many vegetables and pulses that are consumed daily. After boiling pulses and vegetables, they are smeared in spices so that they become tasty and attractive.

1. Moong dal

Material :

Moong Dal	:	25 grams
Ghee	:	1/2 teaspoon
Salt	:	according to taste

Other spices: turmeric, chilly, coriander powder and cumin seeds

Method :

1. Clean the pulse and wash it with clean water twice.
2. Allow dal to soak for 15-20 minutes.
3. Boil 1 bowl of water in the frying pan and keep it in the wet pulse for cooking.
4. Put turmeric and salt and keep it covered.
5. When the pulse is cooked, heat the ghee in a small vessel and fry cumin and add other spices and mix it in the pulse.
6. In the dal, green chillies, green coriander and lemon juice can be added as desired.
7. Serve it with hot with rice and chapati etc.

2. Soup

Material :

Breaded millet	:	20 grams
Moth	:	20 grams
Salt	:	1/2 teaspoon
Black Pepper	:	1/2 tablespoon
Cumin	:	pinch full

Method :

1. Boil millet and moth with water.
2. After completely melting, sprinkle it with a small and thick sieve.
3. Add salt, pepper and roasted cumin seeds in it and serve it in a hot cup before meals.
4. Simmering- This method is on low flame.

Rice pudding

Material :

Milk	:	250ml
Rice	:	10 grams
Sugar	:	10 grams
Cardamom	:	1 small (grinded)

Method :

1. Wash rice and soak them for 10-15 minutes.
2. Boil the milk in the frying pan and mix the soaked rice and cook it on a low flame.
3. Keep stirring the milk with a spoon in between.
4. When the rice is cooked well then add sugar in it and cook it well.
5. Take out the kheer in a bowl and decorate it with cardamom powder and serve hot.
6. To make kheer tasty, you can also add dried fruits, saffron etc.

Millet (Bajra) Raab

Material :

Millet flour	:	20 grams
Buttermilk	:	150 g
Sprouts	:	5 grams
Salt, Cumin seeds	:	according to taste
Water	:	200g

Method :

1. Mix millet flour in buttermilk.
2. Add cumin seeds, stir until it thickens and stir in between.
3. Cook the sprouts for 2 minutes and serve hot or cold.

3. Pressure Cooking

Chickpeas (chole)

Material :

Chickpeas	:	30 grams
Tomatoes	:	25 grams
Onions	:	20 grams
Ginger	:	5 grams
Green Chillies	:	1 or 2
Green Coriander	:	Some leaves
Salt	:	according to taste
Oil	:	1-1 / 2 teaspoon

Other spices: turmeric, chillies, coriander and garam masala powder, cumin etc. lemon / Amchoor / tamarind flavour according to taste

Method :

1. Soak beans, wash, and soak in water throughout the night.
2. Cook it in the pressure cooker with the required quantity of water and salt until it reaches 3-4 whistles.
3. Wash onion, ginger, green chili, tomatoes and green coriander and cut it.
4. Heat oil in a pan and fry cumin seeds and fry till ginger and onions turn golden.
5. Add chopped tomatoes and other spices in it, fry for 3-4 minutes and mix boiled chickpeas in the pressure cooker, cook well and add tamarind/amchoor according to the taste.
6. Now take them out in a bowl and decorate onion with rings, tomato slices, chopped green chillies and green coriander and serve hot.

Moth Bajra Ghoogri

Material :

Breaded millet	:	20 grams
Drained moth	:	10 grams
Onion	:	25 grams
Green Chili	:	1
Oil	:	2 teaspoons

Cumin, salt, water: according to requirement

Method :

1. Cook bajra and moth on low flame for 20-25 minutes in water.
2. Wash onion, ginger and green chillies and cut them finely.
3. Heat the oil and add cumin seeds and then fry onion.
4. Cook spices, ginger and green chillies and add a mixture of boiled millet and moth. Add green coriander and serve hot.

4. Steam cooking

Makki ke Dhokale:

Material :

Maize Flour	:	50g
Onions	:	10-15 grams
Ginger	:	2-5 g
Green Coriander	:	5 grams
Salt	:	according to taste
Oil	:	one big spoon (10-15 gms)
Mustard seeds and cumin	:	1/2 teaspoon of tea
Papad Khar	:	1/4 teaspoon

Method :

1. Sieve the maize flour and mix salt and papad khar , sieve it again so that khar and flour mix well.
2. Wash the onions, ginger and green coriander and finely chop them.
3. Mix chopped onion, green chilies, coriander and ginger in the corn flour, knead the dough.
4. Put a little water in the cooker and put cooker grid (lattice) or steel sieve on the bottom.
5. Make balls of kneaded flour and keep them on the lattice.
6. Put the lid on the cooker without whistle and cook in steam for 15-20 minutes.
7. Heat oil and stir fry the cumin and mustard and put it on steamed dhokalas, decorate it with green coriander leaves and serve incandescent.
8. Mix oil or ghee in non-fried dhokalas and serve with lukewarm pulses.

5. Method of deep frying

Mathari

Material :

Millet flour	:	20 grams
Moth flour	:	20 grams
Maida	:	20 grams
Caraway/ ajwain	:	5 grams
Salt	:	according to taste
Oil	:	for frying

Method :

1. Sieve millet flour, maida and moth flour together.

2. Add a little oil, salt and ajwain and knead the dough.
3. Make small and thick mathari.
4. Take a knife and pierce it.
5. Heat the oil they and fry the mathries in it become light brown on slow flame.

6. Method of Shallow Frying:

Cutlet

Material :

Millet flour	:	50 grams
Sprouts	:	5 grams
Potatoes	:	100 gms
Peas	:	30 grams
Onion	:	50 grams
Green Chillies	:	half
Green Coriander	:	5 grams
Semolina	:	5 grams
Salt	:	according to taste

Method :

1. Wash the potatoes and peel.
2. Chop the Green Chillies, and onion and fry in hot oil.
3. Now add potatoes, peas and sprouts and mix green coriander. Mix millet flour and salt together as well.
4. Prepare the cutlets from this mixture and wrap them in semolina.
5. Shallow fry the cutlets with a little oil on the pan and serve with green coriander sauce.

7. Baking/Roasting:

Roti / Chapati

Material :

Wheat flour	:	50 grams
Salt	:	according to taste
Water	:	for kneading dough

Method :

1. Sieve the flour with salt in it.
2. Add little water and make the dough with a light hand and keep it covered for 5-10 minutes.
3. Make balls from the kneaded flour and roll them with the help of palothan (dry flour) on the chakla frying pan.
4. Keep frying pan on the flame and roast bread.
5. Roast the bread on the pan from both sides.
6. Pour ghee on the roti and serve it with pulses and vegetables.

Bati

Material :

Wheat flour	:	75gm
Salt	:	according to taste
Ghee	:	One big spoon (10-15 gms)
Water	:	to knead the dough

Method :

1. Sieve the flour with salt and mix it.
2. Mix well after adding 1 / 2-1 teaspoon of ghee to the flour.
3. Put a little water and make hard dough.
4. Make two balls of dough and sift it in the hot ash of the fire or in the gas-tandoor.
5. The mouths of the bati open after baking.
6. Pour ghee on bati and serve hot with dal.

CHAPTER : 6

PREPARATION OF FOOD PRODUCTS USING FOOD PRESERVATION METHODS

Food preservation is the process of treating and handling food to stop or slow down food spoilage, loss of quality, edibility, or nutritional value and thus allow for longer food storage.

Storing food items for longer time is important so that they may be used in future as and when required.

Preservation using domestic methods helps in preserving food products at a smaller scale for a family. Home science students can learn preservation techniques in a laboratory and thus prepare various preserved food products.

You have already learnt about various techniques of food preservation.

Using chemical methods of food preservation we can prepare various preserved food items at the domestic level such as marmalade, jam, jelly, syrup, tomato sauce, pickle, etc.

Chemical substances used in fruit protection work:

To preserve food products under fruit protection work the following chemical substances are used:

1. **Citric acid**– It is white, granular and sour in taste. It is known as lemon extract. It is used for giving sour taste to the food and helps in preventing crystals in foods preserved with sugar such as syrup, jam, marmalade, jelly, etc. It should be noted that it is not a protecting factor.
2. **Acetic acid**– It looks like water but has a strong odour which is also known as vinegar extract. It is used in spicy food items such as pickle, chutney, sauce, etc to add sourness and increase taste. 4-5% of acetic acid in water (5 ml Acetic acid + 95 ml water) is known as vinegar. Green chillies, ginger, onion, garlic, blanched vegetables are mixed in vinegar to prepare pickle. White vinegar is a protecting factor.
3. **Sodium Benzoate**– It is a protecting chemical substance which looks like white powder. On touching it feels like chalk powder. It is mainly used in dark colored fruit juices or in foods such as chutney, sauce, pickle prepared with juices of pomegranate, blackberry, squash, tomato, etc. It gets converted into benzoic acid when it is mixed in food items.
4. **Potassium metabisulphite**– It is a protecting chemical substance which white and granular. It converts into sulphur dioxide on mixing with sour fruits or food products containing sourness

of fruits. It is mainly used in light colored fruit juices or squash prepared from them such as lemon, orange, mango, pineapple, litchi, wood apple, etc. Sulphur dioxide removes dark colors of juices therefore this cannot be used for green light colored fruit juices.

In addition to the above preservatives–

Preservation using sugar– 68-70% sugar in food items act as protecting factor. Jam, jelly, marmalade, syrup etc. are preserved using sugar.

Preservation using salt– 18-20% salt in food items act as protecting factor. Lemon pickle, oil-less mango pickle is preserved using salt.

Marmalade preservation– Different fruits according to their shapes and nature either used complete or peeled and cut into pieces, preserved in sugar makes marmalade. All the marmalades are preserved in 68% sugar. Following marmalades are popular– apple, gooseberry, carrot, raw mango, wood apple, etc.

Marmalade made from different fruits is famous by different names–

- Marmalade prepared from ginger is a dry marmalade and is known as candy.
- Marmalade prepared from raw papaya and of green, red and yellow colors is known as tooti-fruity.
- Cranberry marmalade of red color is known as cherry.

Depending on the taste and nature of fruits following solutions are used while making marmalade–

(1) **2% salt solution**– The fruits like apple, pear which change their color after they are peeled are preserved in 2% salt solution. Fruits do not get spoiled in salt solution. (1l litre water + 20 gm salt = 2% salt solution).

(2) **1.5% alum solution**– The fruits which taste bitter stringent such as gooseberry (*awla*) are pricked and then kept in alum solution for 24 hours reduces their bitterness. 15 gm alum and 1 liter water gives 1.5% alum solution.

(3) **2% lime solution**– The fruits which are soft like *bael* are pricked and kept in lime solution for 10-12 hours.

Apple marmalade–

Ingredients–

Apple	:	1.0 kg
Sugar	:	1.5 kg
Water	:	400 ml
Citric acid	:	7 gm

Method– For preparing marmalade at commercial scale, Ambari apple varities are used. If this is not available then small sized fruits are used. Peel the fruits and keep them in 2% salt solution.

1. **Blanching**– Remove the salt solution and blanch the apple pieces in boiled water for 8-10 minutes. If the pieces start getting pricked easily using a fork blanching is complete.
2. **Pricking**– Using stainless steel fork prick all the apple pieces.
3. **Sugar syrup**– Boil sugar, water and citric acid together till syrup gets ready. Pour this syrup on the pricked apple pieces. The next day heat the apple pieces dipped in syrup. When the syrup starts boiling remove the apple pieces from the syrup and let the syrup boil alone for 5 minutes. After 5 minutes, add the syrup again to apple pieces.

Repeat this process for next two days. Syrup gets thick in this process and reaches the inside of apple pieces. If the syrup is boiled for 20 minutes on one single day then the pores that we created in apple pieces by pricking will get clogged with thick syrup, water will not be able to come out of fruit pieces and the pieces will shrink.

4. **Identification of preparation–**

1. The syrup gets thick as honey.
2. The marmalade prepared is 1.5 times the sugar used.
3. The concontration of sugar in the eyrup 68%. Which is measured using a refractometer.

Store the marmalade in a dry and clean jar.

Precautions:

1. Keep the marmalade dipped in sugar syrup.
2. Check syrup after 8-10 days of preparation. Sometimes when the water from fruits is not completely removed it comes out later which makes the syrup watery. Check if the syrup has turned thin; boil it again to make syrup thick.
3. Sometimes syrup gets crystallized. In this case add little citric acid and heat the marmalade to remove crystals.

Gooseberry (Amla) marmalade–

Ingredients–

Gooseberry	:	1.0 kg
Sugar	:	1.5 kg
Water	:	400 ml
Citric acid	:	10 gm

Method–

Big sized gooseberry is used for making marmalade. Firstly fruits are kept soaked in water for 4-5 days. Change the water everyday. This reduces the green colour of the fruit. If you want to prepare it early, this step can be skipped.

1. **Pricking**– Prick the gooseberry using steel fork. Pricking or pressing fruits should cause its juice to come out.
2. **Keeping in alum solution**– Pricked or pressed gooseberries are kept in 1.5% alum solution for 24 hours. Wash them thoroughly in water after 24 hours.
3. **Blanching**– Blanched the fruits in boiling water for 8-10 minutes.
4. **Sugar syrup**– Sugar, water and citric acid are boiled together to make a syrup and add the blanched fruits in it.

For 3-4 days boil the syrup separately for 5-5 minutes just as you did in case of apple marmalade.

Pickle

There is probably no house in India where pickle is not prepared but it is seen sometimes that the pickle gets spoiled. Most of the pickles get spoiled due to absence of salt in pickle. Therefore, the quantity of salt used while making fruit/vegetable pickles is divided into 3 parts–

20% Salt– This much amount of salt acts as a protecting factor in food items. Therefore, pickles which depend only on salt for preservation are prepared by using 200 gm salt in 1 kg fruit or vegetable and other required spices. For example lemon pickle and oil-less mango pickle is preserved using 20% salt.

15% salt– Pickle using fruits/vegetables which are sour or styptic, bitter or sharp in taste is made using 150 gm salt, 250 gm mustard oil, 5 gm actic

acid, 1 gm sodium benzoate and required spices. Such pickles are those of bitter gourd, gooseberry, chili, onion and cranberry.

10% salt– Pickle made using fruits and vegetables which have light taste requires 1 kg of fruits/ vegetables, 1oo gram salt, 10 gm acetic acid, 1 gm sodium benzoate, 250 grams of oil and other essential spices. Such pickles are carrot, cauliflower, radish, turnip, jack-fruit, etc.

Pickle made using different vegetables–

Ingredients–

Cauliflower	:	1kg
Green peas	:	500 gm
Carrot	:	500 gm
Green chilies	:	500 gm
Lemon	:	250 gm
Radish	:	500 gm
(Total weight of vegetables: 3.250 kg)		
(Weight of pickle: 2.00 kg)		
Salt	:	200gm
Turmeric	:	50 gm
Red chili powder	:	30 gm
Garam masala powder	:	20 gm
Fennel seeds	:	50 gm
Mustard seeds	:	50 gm
Asafetida	:	to taste
Mustard oil	:	500 gm
Ginger	:	200 gm
Acetic acid	:	10 mg
Sodium benzoate	:	2 gm

Method –

Peel the vegetables and cut them into pieces. Blanch carrots and cauliflower for 6-7 minutes and green peas for 4-5 minutes. Spread the blanched vegetables on a cloth to remove extra water. Put the vegetables in a big bowl and add chopped green chilies, chopped ginger, lemon, salt, powdered spices, ground mustard seeds, fennel seeds and asafetida. Add boiled oil after cooling it in the mixed vegetables and add acetic acid and sodium benzoate to it. Mix everything together and fill the mixture in a jar. Keep the mixture for 2-3 days and then it can be used.

Mango pickle

Ingredients:

Raw mango	:	5kg
Salt	:	750 gm
Turmeric powder	:	125 gm
Red chili powder	:	75gm
Garam masala	:	50 gm
Fennel seeds	:	125 gm
Fenugreek	:	100 gm
Nigella seeds (*kalaunji*)	:	75 gm
Asafetida	:	5 gm
Mustard oil	:	1.5 L
Acetic acid	:	20 mg
Sodium benzoate	:	5 gm

Method– Indian variety of raw mango is suitable for making pickle. Wash the mangoes and cut each of them into 4-8 pieces. Add salt, spices to the mangoes and keep them under sun for 1-2 days. Keep the mangoes covered with cloth. After 2 days, add hot oil, acetic acid and sodium benzoate. Mix them well and fill the mixture in a jar. 15-20 days later, pickle is ready.

Lemon pickle

Ingredients:

Lemon	:	1 kg

Black salt	:	50 gm
Salt	:	150 gm
Celery seeds	:	20 gm
Ginger	:	50 gm
Garam masala	:	25 gm
Black pepper powder	:	25 gm

Method–

Wash the lemons and slice each of them into 4 pieces such that they remain joined from one side. Mix salt, celery seeds, spices and finely chopped ginger together. Press and squeeze out lemon juice, now add the mixed spices and store the mixture in a jar. Add lemon juice to the jar and keep the jar for 1 month. Mix the jar contents once in a while.

Note–sweet-sour pickle can be prepared by adding 500 gm of sugar or sugar syrup.

Adding 50 gm *harad* and 25 gm cloves can increase the nutritional quality of pickle.

Tomato sauce or ketchup

Ingredients:

Tomato	:	2 kg
Ginger	:	25 gm
Onion	:	50 gm
Garlic	:	5 gm
Acetic acid	:	10 mg
Sugar	:	160 gm
Salt	:	25 gm
Red chili powder	:	10 gm
Garam masala	:	10 gm
Sodium benzoate	:	1 gm

Method :

Fully cooked tomatoes are suitable for making ketchup. Chop the washed tomatoes and put them in a pressure cooker. Add chopped ginger, onion, garlic into this. 3-4 whistles will cook the vegetables. Sieve the vegetables using a stainless strainer. Now cook the seedless tomato juice.

1. **Sugar and salt–** As the juice thickens add sugar and salt to it.
2. **Spices–** Add spices to it using any of the 3 methods–

(i) **Adding extract of spices–** Boil *garam masala* and powdered black pepper in water for 7-8 minutes. Strain the water and add this extract to the tomato juice and boil it.

(ii) **Bag method–** In this method, powdered red chili and *garam masala* is tied in a cloth and put these tied spices in tomato juice. When the sauce gets ready remove the cloth. Make sure that the tied cloth does not get open and stays dipped in juice.

(iii) **Adding spices directly–** Add powdered spices directly into the sauce and cook the sauce.

Identification of preparation– Put few drops of sauce in a plate and check if water gets separated from sauce. If water is not seen separately sauce is ready.

3. **Sodium benzoate and acetic acid–** When sauce gets ready remove it from flame and add sodium benzoate and citric acid to it. Store the ketchup in a bottle or jar and keep it covered.

Jam

The pulp of the fruit is cooked with sugar and sour substances for a limited time which gets settled into a thick paste when ready. Jam containing 68% sugar remains preserved. Different fruits like apple,

mango, pear, pineapple, etc or a mixture of them can be used for making jam.

Apple jam

Ingredients:

Apple	:	1 kg
Water	:	20 ml
Citric acid	:	7-8 gm
Sugar	:	750 gm
Orange-red colour	:	according to requirement
Amaranth colour	:	according to requirement
Apple/ mixed fruit essence	:	20 drops

Method–

For making jam, sour apples are suitable. Cut apples into medium pieces and cook in a pressure cooker with 200 gm water. After 4-5 whistles, strain the cooked apples with steel/aluminium strainer. To the pulp obtained add sugar and a little amount of both types of colours. While cooking continuously stir the pulp. When it becomes thick add citric acid.

Identification of preparation–

1. **Plate test**– In this test, put a little amount of jam in a plate after it has cooled down. Now slightly tilt the plate and observe the flow of jam. If the jam moves in one direction jam is ready.
2. **By thermometer**– When the temperature of cooking jam rises to 222^0F, jam is ready.
3. **By refractometer**– When sugar in the cooking jam becomes 68-70%, jam is ready.
4. **By weight**– Normally the jam prepared is 1.5 times the sugar used in the making of jam.

By testing the jam using any one method, turn off the flame and add essence in required amounts and fill it in a jar.

Jelly

A fruit-flavoured dessert rich in pectin made by warming and then cooling a liquid containing gelatin, sugar in a mould or dish so that it sets into a semi-solid, somewhat elastic mass. Pectin is present in sufficient quantities in guava, sour apple, cranberry, plum, etc. While making jelly from fruits not containing pectin, pectin powder is added. In the jelly prepared sugar is kept up to 70%. Therefore, it is a sugar preserved product.

Guava jelly

Ingredients:

Guava	:	750 gm
Water	:	1 L
Citric acid	:	6-7 gm
Sugar	:	500 gm

Method–

For making jelly, fully ripened and less cooked fruits are used. Fruits are cut into small pieces and are cooked at medium flame for 35 minutes and then strained using a cloth. The strained liquid is known as pectin liquid. This liquid is used for making jelly. The leftover of the fruit is not used in jelly. Sugar equal to the amount of liquid is used. Mix the sugar well and cook the liquid at high flame. Stirring the liquid while it is cooking is not necessary. Add citric acid before cooking gets completed. Colour can also be added to the jelly if required.

Identification of preparation–

1. Take the cooked liquid in a plate and slightly tilt the plate and see if the jelly flows into a sheet, Jelly is ready.
2. **By thermometer–** When the temperature of cooked liquid becomes 222^0f, it is ready.

3. **By refractometer**– When sugar becomes 70% in the cooked liquid, it is ready.

Remove the liquid from flame once it is cooked. Remove the froth from the cooked jelly and store it in a jar. Cover the jar only when jelly cools down.

Syrup

All types of syrup are preserved using sugar. Therefore, 68-70% sugar should be present in the syrup. Following are the popular syrups–

1. Fruit syrup– lemon, pomegranate, orange, pineapple, etc.
2. Flower and herb syrup–rose,*kewda, khas*, etc
3. Artificial syrup– rose, *khas*, orange, pineapple etc.

The above syrup/squash can be prepared using fruits, flowers or herbs according to taste and colour.

Ingredients

Sugar	:	800 gm
Water	:	250 gm
Citric acid	:	4-12 gm
Fruits/flowers/herbs or extract	:	100 gm
Food colour	:	½ gm
Essence	:	2-3 gm

One empty bottle

Method

Cook sugar, water and citric acid together and when sugar gets dissolved cool the mixture. In the sugar syrup add fruits/flowers/ herb, colours and essence. Mix them well. Syrup is ready.

Lemon syrup

It is an old and simple method. Take 800 gm sugar in a bottle. Add about 225-250 gm lemon juice into the bottle. Put this bottle under sun till the sugar gets dissolved. You can add 25 gm ginger juice or ½ spoon of mint juice into the bottle. This syrup remains preserved using sugar.

Squash

Normally squash contains 25% fruit juices, 45-50% sugar, 1.2-1.5% sourness and remaining water. It can be preserved using any one of the following chemicals–

1. **Potassium metabisulphite**– Light colored fruit juices/squash are preserved using this chemical. Examples are lemon, orange, wood apple, litchi, pineapple, etc.
2. **Sodium benzoate**– It helps in preserving dark colored squashes. Examples are pomegranate, plums, etc.

Orange squash

Ingredients

Oranges	:	500 gm
Sugar	:	500 gm
Citric acid	:	10 gm
Water	:	300 ml
K.M.S.	:	1gm
Orange colour	:	½ gm
Orange essence	:	2 gm
Empty bottle		

Method

Mix sugar, water and citric acid and prepare syrup. Strain and cool it. Add orange juice into this syrup and strain it again. Now add orange color, essence and KMS to water and mix them well. Now add this mixture in the syrup. Put this in a bottle.

Prepare the above mentioned marmalade, pickle, sauce, jam, jelly, syrup, squash in your laboratory. Write the method of preparation in your practical notebook and rate them on the basis of taste, colour, aroma, trend and presentation in a table. Rate the preparations as very good (5), good (4), okay (3), bad (2), very bad (1).

S.No.	Preserved food	Taste	Color	Aroma	Trend	Presentation	Other remarks
1	Apple marmalade						
2	Gooseberry marmalade						
3	Mixed vegetable pickle						
4	Mango pickle						
5	Lemon pickle						
6	Tomato sauce						
7	Apple jam						
8	Guava jelly						
9	Lemon syrup						
10	Orange squash						

UNIT : IV
CLOTHING AND TEXTILE

CHAPTER : 7
IDENTIFICATION OF DIFFERENT TYPES OF CLOTH

The revolution in textile industry has led to the evolution of textile manufacturing using imitable fibers. Silk like cotton and cotton like silk are prepared. This has made identifying of real fibers difficult. To identify fibers, testing is essential. There are 3 methods of testing–

Physical test–

1. **External appearance test**– By touching the fabric external appearance is tested. Length, shine, softness, tensility and flexibility are checked by pulling a single thread from the fabric.
2. Length and diameter are measured.
3. **Strand break test**– In this test, thread is pulled and broken and then its form is tested.
4. **Crease test**– The fabric is folded, pressed or held tightly in hands and then is released. The crease in the fabric and the time for which it stays is tested.
5. **Combustion test**– The fabric made of single fiber is easily tested by combustion. The ash of the burnt fabric is tested minutely and deeply.
6. **Fabric tearing test**– Fabric is stiffened and then torn and tested. Ink test, oil test, moisture test, calendar test, etc are also performed to test fabric.

Microscopic test–

The shape, type, texture, flexibility and roughness of the fiber are tested. For the test, first of all–

1. The finishing of textile is removed.
2. Then a fiber is removed from the fabric and is soaked in water for 5 minutes.
3. The fiber is placed straight on a clean slide. Put a drop of water on it.
4. Add a drop of 10% glycerin. Put a cover slip on the fiber and examine it under a microscope.

Table - Test of Cloth Fibre

Physical	External appearance	Length and diameter	Crease test	Oil test	Fabric tearing test	Microscopic test	Picture
Cotton (cotton cloth)	1. Hard, rough, fluffy	½ ” to 3-½” long	Rapidly and remains for longer time	Stain is opaque, appears dark and cloudy	Tears when excess force is applied	Sap remains filled in a tube containing immature stage, Mature fiber is flat, rough like a ribbon	
	2. Shining and lack of elasticity	16-20 m diameter					
	3. Cool						
Woolen cloth	1. Soft	1” -3” long	No crease			Rough, zigzag surface, both ends are pointed	
	2. Elasticity and flexibility						
	3. warm						
Silk	1. smooth, soft and shining	1200-4000 ft long a-11 u diameter	Crease stays for a little time		Tears with a sharp sound of tearing, cloth stretches	Transparent strand which is round, smooth, shining, lines on the surface	
Silk cloth	Shining, attractive, soft, heavier than silk, hard, less flexible	Length and diameter according to need	No crease		Being imitable, qualities according to weaving	Semi-transparent smooth, soft, thin, fine, round shaped	
Nylon cloth	Sometimes soft or hard on touch, warmth rich softness, fine	According to need	Crease appears fast and easily but goes away when hung	Catches fire easily, flame is shining, yellow-orange, ash is brown-black	Like silk tears with a sharp tearing sound, wavy	Transparent, round, smooth, shining, nitro-cellulose, longitudinal lines on the fibers.	

Chemical test– using required chemicals and instruments, skilled, trained and experienced inspectors check the reaction of acid- base on fibers.

Collect different fabrics and identify those using different tests–

Fibers	Physical test	Microscopic test
Cotton		
Woolen		
Silk		

Observation points- Physical test–

1. External appearance
2. Length
3. Crease
4. Combustion activity
5. Fabric tearing

Microscopic test–

Inspection of dark colours– Effect of water, soap, light, sweat, temperature, etc on colour of cloth

For inspection– Iron a piece of wet cloth between white cloths. If the colour of cloth is not fast then it will move on the white cloth.

CHAPTER : 8

CONSTRUCTION AND IDENTIFICATION OF DIFFERENT TYPES OF WEAVES

Knitting is formed by pulling a loop of the working yarn forward through an existing stitch and then slipping that stitch off the needle. Knitting is done both with hands or using machine. While knitting using a machine**,** different types of threads are used depending on variety, samples of fabric for making woolen clothes, sweater, cap, socks, undergarments and other hosiery.

Requirements for knitting–

1. **Wool or knitting yarn–** Wool or yarn of different colour and thickness is used for knitting.
2. **Knitting needles**– Different types of needles made of metal or plastic are used.

(i) **Simple Straight needles**– They are available in pairs from 0-16 numbers. One end of it is pointed and the other end has a knob. With the increasing number of needle, thickness of needle decreases.

(ii) Both sides pointed– Both side pointed needle is used for knitting sweater, socks, etc.

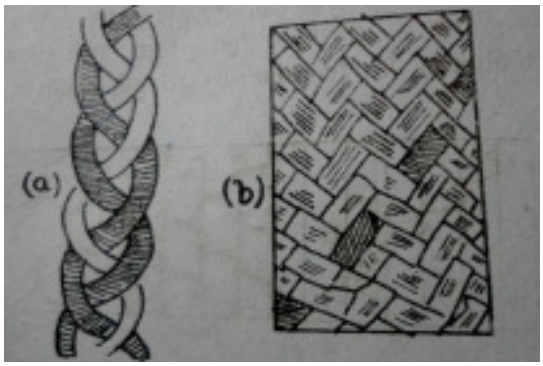
(iii) Round needles– The pointed ends face each other and stitching of fabric is not required.

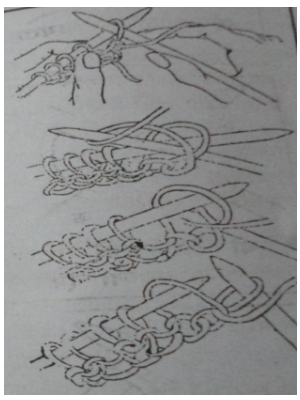
(iv) Needle for stitching– Thick needle with less thick end is used for–

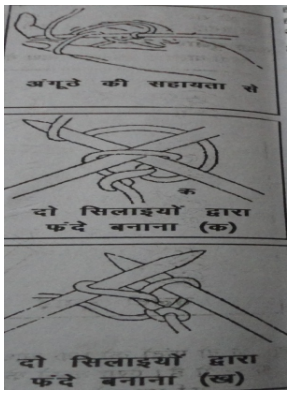
1. Making a loop of the working yarn forward through an existing stitch and then slipping that stitch off the needle.
2. Making useful samples

Identification and manufacturing of knitting–

Knitting is done by a set of connected loops from a series of yarn in warp or weft direction. The different number and sequence of weft and weft threads give strength and new form to the knitted fabric.







Knitting art

Questions :–

1. Make 2 samples using knitting and paste them in your practical book.
2. Collect different samples of knitted fabric, identify those and paste only 3 of them in your practical book. (only three)
3. Paste samples of simple knitting, twill knitting, satin knitting, etc any two on paper or wool and paste them in your practical book.

CHAPTER : 9

PREPARING SAMPLES OF TIE AND DYE, BLOCK AND FINE PRINTING

Bandhej

Rajasthan and Gujarat are famous for this art. It is a symbol of good luck and prosperity. Red, green, yellow colours are especially used in this. But in today's fashion all colours are used in *bandhej*.

Materials:

Fabric, colours, thread, simple salt, wooden spoon, pot and gas, water, needle for design, sharp pencil and other dyeing substances.

Fabrics– georgette, malmal (muslim), cambric, silk, etc.

Methods of binding–

1. By nip– Tying knot in the cloth on the nip of nail, pencil, sharp wood.
2. Tying different things– Tying gram, peas, seeds, pearls, etc in the cloth at regular intervals.
3. Tying knots– Tying knots in the cloth at regular intervals.
4. By folding cloths– Tying threads or clip, rubber bands according to design.
5. *Leheriya*– Tying thread to the cloth from one end to another making a design.
6. Marbling– In this technique, fabric is crushed into a round and then tied with a thread.

Method of dyeing–

Fabric is tied using a thread according to the design. Mix the color well in a little water. Then boil the water for the cloths. Add salt, colour solution and tied cloth the boiling water. Stir the boiling water with a wooden spoon. Keep the cloth in this water for at least 15 minutes. Thereafter, remove the cloth from the water and place it under running water till stops learning colour out. To fasten the colour, add colour fastener or dip the cloth in salted cold water for 3-4 hours. Remove it from this water and squeeze out the water and keep it for drying in shade.

For colouring cloth with more than one colour, colour first with light colour and then with dark colour keeping the tied cloth intact. After drying the cloth, cut the threads and iron the cloth.

Prepare 3 samples of *bandhej* and paste them in your practical book.

Block printing–

Blocks of wood or linoleum of different shapes and designs are used for making designs of different colors on clothes.

Material required– Cloth, printing colors, urea, acrifix binder, different blocks, sponge, and printing table.

Method–

Prepare a paste of colours, urea, and binder in a wide-mouthed pot. If different designs are to be made then different blocks are used.

Place a soft bed or blanket on the printing table and cover it with plastic sheet. Now place the cloth to be printed. Pour the colour paste on the sponge. Press the block on the sponge and then the coloured block on the cloth. When one color dries then the second color is used. This activity performed is done on the entire cloth. Block is pressed with equal pressure at all times to keep the colour of all designs same. The cloth is dried after printing which is followed by ironing..

Prepare three samples of block printing and paste them in your practical book.

UNIT : V
HOME MANAGEMENT

CHAPTER : 10
HOME DECORATION - FLOWER DECORATION, FLOOR DECORATION AND ORGANIZING COMPETITIONS

Meaning of home decoration – The art of decorating one's home is known as home decoration or interior decoration.

"Interior decoration is a creative art which can transform an ordinary house. It is the art of adjusting the space and equipment to suit the fundamental cultural needs of the dwellers and thus creating a pleasant atmosphere. – Stella Sundararaj.

Objectives of home decoration–

1. **Beauty**– The first objective of home decoration is to make home beautiful and attractive. Beautiful things whether they are living or non-living are liked by everybody. 'Beautification is the combination of those qualities which give pleasure and happiness to eyes, ears and mind.'

   Combination gives form to home decoration. Therefore, home decoration and art are complementary to each other. Beauty of anything can be judged by studying the elements and principles of art.

   The main principles of art are–

   (i) Proportion (ii) Balance

   (iii) Rhythm (iv) Emphasis

2. **Expression–** A well decorated home is one which is consistent, all things in which are in appropriate proportion, structure and rhythm. Their shapes and forms are in proportion.

   The main qualities of a well decorated house are –

   (1) Formality (2) Informality

   (3) Naturally (4) Modernity

3. **Usefulness**– Home decoration should be done in such way that it takes less time, money and energy. Materials should be organized in an ordered manner and decoration should be comfortable and convenient.

4. **Variation**– Depending on the variation of use, room decoration should also be varied. Variation in home decoration can fill the family members with excitement, happiness, joy and enthusiasm. Excitement peps up people to work happily.

5. **Originality**– Creativity is the second name of art. Decoration arrangements of rooms and their management tell about the likes, nature, attitude, lifestyle and culture of the homemaker and other family members.

6. **Austerity–** A normal person can spend less on resources and yet can do an attractive and likeable home decoration. Less furniture, appliances can also create an attractive look. Austerity should not be only in money but also time and energy.

Floral decoration

Floral arrangement– Flower arrangement is an art. The main objective of this is making the environment living, attractive, beautiful and fragrant. Flower arrangement is the art of using plant materials and flowers to create a pleasing and balanced composition to increase the beauty and attraction of occasion, place, things and home which make the environment happy and joyful.

Material used for flower decoration :

Flower pot or container– Pots of different shapes, sizes, colors, structure made of different metals, porcelain, marble, wood, rock, plastic may be used.

Points to remember while choosing a flower pot:

Flower pot should be chosen keeping in mind the style, place, amount, colour and shape of flowers to be used in home decoration.

- Dark coloured pots look beautiful with light colored flowers.
- Shallow flower vase should be used on dining table
- Glass vases should be used for doing a formal floral decoration.
- To provide grip to the flower decoration, stem holder should be used for keeping the flower stems together.

Necessary planting material for floral decoration:

- Flowers should be picked before sunrise and sunset.
- Keep the flowers in water
- Remove the green leaves of flowers
- In case the stems of flowers secrete a white substance, wrap the flowers in wet cloth and immerse their stems in boiling water for 1-2 minutes.
- Always cut the stems of flowers diagonally. Rub the cut portion of flower with a pinch of salt. This keeps the flower alive for more time.

Types of floral decoration–

1. **Linear design:**

(1) Create the linear floral design in your mind first.

Figure : 10.1 Group arrangement

Figure : 10.2 Ikebana

(2) The type of line such as C, F, E or S to be used for design should be clear in the mind of decorator.

(3) Vase should be chosen and then the thickness and length of flowers is chosen which is 1.5 times that of the vase.

(4) The stems of flowers should be used to create the base according to the chosen linar a design. Care should be taken to maintain continuity in the external line because this line gives speed to the decoration and decides the length, breadth and depth of the decoration.

(5) Empty space should also be given importance in floral decoration. Accessories like shells, oyster, starfish, rocks, pebbles, etc can be used to make decoration attractive.

Figure : 10.3 Linear

2. **Group style of flower decoration**

- Group floral decoration should be done in big sized vase and vase should be covered with a net.
- Water in the vase should be enough to dip even the last part of stems.
- The thickness and length of flowers chosen is 1.5 times that of the vase. The width of decoration should be double than that of vase.
- Spread the stems of flowers in different directions using the net. They can be randomly arranged.
- To make decoration attractive, put the brightest beautiful flowers in the centre of the decoration.

3. Small flower decoration

The length of this should be 4.5" to 5.5". Small bowl, glass, plate, wide-mouthed jar should be used for this decoration.

4. **Mixed flower decoration**

This type of floral decoration is also known as American style of floral decoration. The characteristics

of linear as well as group style decoration are incorporated into this to create a new style of decoration.

5. **Japanese flower decoration**

In this style, flowers, leaves, stems are used in specialized ways and the height is 10-15 feet.

- Ikebana– It is decorated in wide mouthed vases or pots.
- Moribana and najire– For moribana, wide and shallow pots are used and for najire long vases are used.

Floor decoration

1. **Mandana**

It is folk art of Rajasthan. It is painted by women on floor or walls on special occasions. Mandana has been derived from 'mandan' which means to decorate. The traditional designs used in this are geometrical and floral designs. Mandana is mainly painted on cast floor and wet colors like reddle are used.

Figure : 10.4 (Mandana)

2. **Rangoli**

Rangoli is an ancient cultural tradition and a folk art. It is drawn on special occasions like festivals, fasts, *puja*, weddings, and celebrations using dry and natural colours. Simple geometrical designs or images of god-goddesses are drawn as designs.

Figure : 10.5 (Rangoli)

The colours used are dry or wet rice, vermilion, turmeric, dry wheat flour and other natural colours. Sometimes wooden sawdust is also used. Alpana is another name for rangoli.

Rangoli is an ornamentation art which is known by different names in different parts of the country. Rangoli is known as chalk poorna in Uttar Pradesh, mandana in Rajasthan, aripan in Bihar, alpana in Bengal and Kollam in Kerala.

The main elements of rangoli are–

1. Paste of ground rice
2. Powder of dry leaves
3. Charcoal
4. Burnt wood
5. Wood sawdust

Clean floor or cast floor is used for rangoli and

sometimes wall too. Rangoli is drawn in the centre, at corners or as vines on four corners.

Rangoli is made in two ways. Dry and wet rangoli both can be drawn free hand or by joining dots.

1. Dots are made in any design using white colour.
2. These dots are joined using different colours and design is completed.
3. Fill in the colors in the design.
4. Traditional mandana uses colors like reddle.
5. Stencil can also be used for making rangoli. The stencil has small holes and colors drop from these holes on the floor and design is created.

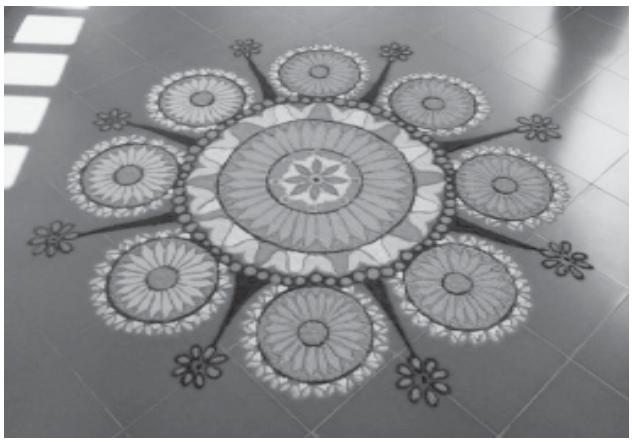


Figure : 10.6 Alpana

6. Wet rangoli is prepared using ground rice mixed in water. This rice solution is known as 'epan'. Turmeric powder is used for making this rangoli colorful.

CHAPTER : 11

PREPARING FIRST AID KIT AND PROVIDING FIRST AID DURING ACCIDENTS

What is a first aid kit?

First aid is given when someone has met with an accident and is injured but the availability of doctor or reaching the hospital takes time. The person giving first aid or the primary physician should have essential things with him. The essential things required for treating the injured are collected in a first-aid kit.

First-aid is given in cases of bone fracture/ dislocation an insect bites, burning of skin, poisoning, bites or cuts. Any of the above situations, accidents, diseases or emergency situations need first-aid for immediate relief.

Figure : 11.1 (First Aid Box)

Making a first-aid kit–

Every school, house, factory, work place should have a first-aid kit. First-aid kit should be well organized and complete. It should be light weight, durable and easy to open which can be carried from one place to another.

The items to be kept in first aid depend on the knowledge and experience of the person who will be using the first-aid kit. A first-aid kit normally has following items–

Figure : 11.2 First Aid Kit (with items)

1. First-aid kit manual– How is first-aid given and how are the items used are written in the first-aid manual. Therefore, this manual should be kept in the kit.

2. Triangular bandage– This is used as sling for giving support to an injured or broken body part of the injured person.
3. Bandages– These are used for covering wounds or sprains.
4. Round bandages– These are used for wounds.
5. Sterile Gauze– A clean gauze should be available with the first aider. It is used for covering the wounds.
6. Adhesive tapes– These tapes are used for sticking bandages on small wounds.
7. Safety pin– This is used for keeping the bandage intact on the wound.
8. Scissors– It is used for cutting bandages.
9. Tweezers/Forceps– It is used for removing prick or glass hand sanitizer.
10. Hand sanitizer (Soap)– It is used for washing hands before and after treatment.
11. Thermometer– It is used for measuring temperature of the patient.
12. Antiseptic lotion– Dettol, savlon etc antiseptic lotions are used for cleaning the wounds and disinfect them.
13. Whistle– It can be used for calling some other person for help.
14. Match box– Tweezers, scissors are heated in flame to make them germ free.
15. Dropper– It is used for giving drops of medicines or water to the injured.
16. Vaseline– Vaseline is used as a lubricant.
17. Vicks– It is used for making breathing normal of the injured person normal.
18. Balm– It is used for reducing pain.
19. Knife/Blade– It is used for cleaning wounds.
20. Glass– It is used for giving medicines to the injured.
21. Eye wash cup– It is used for washing eyes of the injured person.
22. Glucose– It is used for a instant energy to the injured.
23. Splinter– This is used for giving support to broken bones.
24. Tapes for splinters– Tapes are needed to bind the splinters to the bones.
25. Kidney shaped tray– It is used for keeping first aid items.
26. Torch- In case of working at night torch is needed.
27. Burnol– In case of burns, burnol cream is used.
28. Plastic sheet– This is used for laying the patient on ground before starting treatment.
29. Oral rehydration sheet– This is given to the patients to make up for the water loss in the body.
30. Medicines– Some medicines should be present in the first-aid kit.

    Pain killers– Paracetamol, Diclofenac, etc.

    Antibiotic medicines– Neosporin, Povidone Iodine

    Anti-diarrheal– Rinifol, Loperamide, ORS solution, etc.

Anti-asthmatic– Salbutamol, Asthalin inhaler

Anti- vomiting– Sequil, Stemetil

Antihistamine– Avil, Benadryl, Phenergan

31. Record book and pencil– To write the information related to the injured or making an observation chart keeping a record book and a pencil is important.

32. Disposable gloves– The first aider should wear disposable gloves before treating the injured person to prevent himself from infections.

33. Cotton– Cotton is essential in the first-aid kit. It is used for cleaning wounds.

34. Antibiotic ointment– Betadine or Soframycin is applied on open wounds.

35. Hot water bag– It is used for providing relief to a painful part of the body.

36. Cold cap– In case of high fever, cold cap is placed on head.

All these things should be kept in a clean, strong and water proof box. Make a red cross on the first aid kit using red tape or color so that it can be easily identified. Write the name of your family doctor, ambulance's name and contact numbers. Check the things every 6 months for their expiry dates. Change as necessary.

3. How to use first-aid kit–

Do not lose your senses in case of an emergency medical condition. Use it when situation arises. Use the first-aid kit keeping some important points in mind–

1. If you meet with an emergency situation, shout for help. If you are fine, help others who are injured. If possible call a hospital and police.
2. You should have some numbers written which you can call in case of emergency. Write the emergency numbers such as police, ambulance, hospital, fire-brigade on first-aid kit as well.
3. Do not leave the injured person alone. Your company will keep them strong and empathizing with them will strengthen them even with grave injuries.
4. If injury is not serious you may give the first aid.
5. In case of fracture, do not move the fractured part.
6. Try stopping the bleeding and carefully bandage the wounded area.
7. In case of burns, do not try removing skin or cloth from that area, wash it with clean water but do not apply any cream or ointment.
8. Wash your hands in case you decide to give the first aid but take care of yourself too.
9. Do not give any food or drink to the injured immediately after accident, it may cause vomiting and worsen his condition.
10. Lay down the injured person on ground, taking care of his injuries and make sure his breathing is proper.
11. Keep the crowd away from the injured. Lay the injured in an airy place.

Prepare a first-aid kit for your laboratory and prepare a small kit for keeping with you while travelling.

1. First aid kit for keeping in laboratory

S.No.	Name of material	Use
1		
2		
3		
4		
5		

2. Small first-aid kit to keep with you while travelling

S.No.	Name of material	Use
1		
2		
3		
4		
5		

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