UNIT - I
MEANING OF HOME SCIENCE

Home Science is the science of a home. It includes all the things that concern ourselves, our home, our family members and our resources. It aims at getting maximum satisfaction for our family members through scientific use of resources.

Home Science means the art of managing our resources effectively and the science of achieving healthier, happier home and a successful career.

In the definition given above, we know that the words "art" and "science" are used together. Because Home Science teaches us the art of using things so that a beautiful, harmonious whole is achieved and an overall pleasant effect is created. It also gives us the knowledge of the scientific procedures involved in making a home beautiful. For example Home science will teach us about the different nutrients required by the body and the different functions they perform. This is "science". It is an 'art' when we are able to select various dishes having those necessary nutrients and serve them attractively to our family.

This combination of science and art holds true in every sphere of our life like any of the following :

(i) the house that we live in
(ii) the food that we eat
(iii) the clothes that we wear
(iv) the family that we care for

(v) the resources that we use
(vi) the environment around us
(vii) the skills that can lead to a successful career

Importance of Home Science

We can learn to manage our own resources better by learning about the various areas of Home Science. If we face any problem, it gives us the right direction to solve them. While doing so, we become a more efficient individual. We can use this knowledge for the improvement of our life and home. Our family members can achieve more satisfaction and use the skills gained to improve our economic condition. When we are able to fulfill the needs of our family members, our family members will be in a better condition to take up responsibilities both at home and outside the home.

Home Science helps us to manage the resources like time, energy, skills etc.

Today, more and more women are earning whether they go out of home or do something in their own home itself. As a result the responsibility of the home has to be shared by the men as well. Since men have not been very active in the home traditionally in our society, they find it very difficult to adjust. Men need to be oriented towards the different aspects of a home and have to learn to appreciate the effort that goes into making a comfortable home and to run it smoothly. Home Science is the only subject that gives such an orientation and information to young people which make them to become successful home makers, responsible citizens and good parents.

Scope of Home Science

There are lots of misconception regarding Home Science. It is generally believed that Home Science is limited to home only. It is a subject about household chores and home making and is meant only for girls. This is a common misconception about Home Science. On the contrary, its scope extends far beyond the 'home' and is not

limited to cooking, laundry, needle work and home decoration alone. Home Science claims to be the only subject which trains the students for two important goals in life, these are : (i) caring for the home and family and (ii) a career.

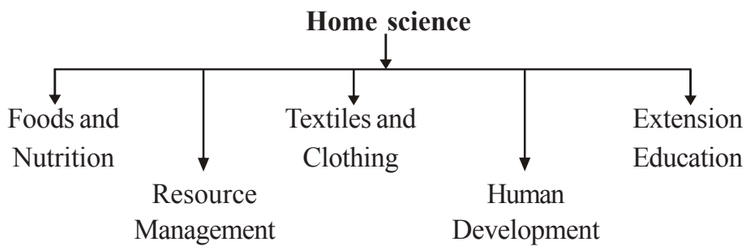
At present times men and women are sharing responsibilities in every walk of life, training for efficient home making and better living is as important for men as for women. It puts emphasis on the value of Home Science. Various job opportunities in the field of Home Science are not limited to only women, but men too can avail of them.

It is clear from the discussion that the scope of Home Science is too vast. It comprises in itself various activities of our daily life-the food we eat, the houses in which we live, the clothes we wear, family relationship, bringing up children and proper use of resources to achieve maximum happiness. Home science is a great guide as it helps young boys and girls to understand their role and responsibilities in the family and community. It helps them in the management of resources and preparing themselves as responsible future parents.

Constituent areas of Home Science

In the lesson that we have studied so far, you must have understood that Home Science is an important area of study. Let us now find out which are the constituent areas that we have to study in this subject.

There are five major components which are as follows :-



Main Branch	Sub divisions
1. Foods and Nutrition:	(i) Food Science
	(ii) Nutrition - Clinical nutrition and community nutrition
	(iii) Institutional food services
2. Resource Management	(i) Resource management
	(ii) Housing and Equipment
	(iii) Interior decoration
	(iv) Consumer education
3. Textiles and Clothing	(i) Clothing construction
	(ii) Textile Science
	(iii) Textile designing
	(iv) Garment designing
	(v) Care and Maintenance of cloth
4. Human Development:	(i) Child Welfare
	(ii) Adolescence, marriage, family guidance
	(iii) Care of the elder persons
5. Extension Education	(i) Preparing Home Science educator
	(ii) Community Services and Welfare
	(iii) Non formal Education

UNIT - II
FAMILY : A UNIT OF SOCIETY

Family : Man is a social animal. He cannot live alone and prefers to stay in group. A group of parents, children and helpers, etc., is termed in Latin as 'FAMULUS', meaning Family. Family is the basic unit of every society. Various sociologists have defined family differently.

Definitions

"By family we mean a system of relationships existing between parents and children". - CLARETHOMAS H.

"A family is a group of persons united by the ties of marriage, blood or adoption, constituting a single household, interacting and inter communicating with each other in their respective social role of husband and wife, mother and father, son and daughter, brother and sister and creating and maintaining a common culture".

- E.W. BURGESS and H.L. LOCKE.

"The family is a group defined by a sex relationship sufficiently precise and ensuring to provide for the procreation and upbringing of children".

- MACIVER. RM and PAVE. C.H.

Types of Family

There are different types of families found all over the world. Various sociologists have described different types of families. The classification of families is based upon the following factors :

On the basis of type of marriage

On the basis of the type of marriage, families have been classified as :

(a) Monogamous Family : In this family the married couple and their children stay. It is formed on the basis of a single marriage.

(b) Polygamous Family : When one male or a female marries more than one female or male, a polygamous family is formed. This type of family is not common in modern societies, nor is approved by the society.

On the basis of descent and authority

On the basis of authority that a person holds in a family, families are of two types :

(a) Matriarchal Family: In such a family the mother wields the major authority. The mother and her family stay together. The family name of the mother's side runs through her children. The husband comes to stay with the wife's relatives.

(b) Patriarchal Family : The authority in such a family lies with the father. The wife goes to stay with her husband and his relatives after their marriage. Children carry father's name. The father holds the authority to take major decisions.

On the basis of size

Families are of two types on the basis of their size.

(a) Nuclear Family : It is also called primary family. It refers to such families in which a husband, his wife and their children stay together.

(b) Joint Family : It is also called extended family. Husband, wife, their children and husband's relatives stay together. Thus it is a cluster of two or more nuclear families.

On the basis of community

According to this classification, families can be either rural type or urban type.

(a) Rural Family : A rural family may be defined as a group of persons consisting a family which lives in an agricultural or open country environment. It is generally characterised by a relatively early age of marriage, high birth rate and low divorce rate.

(b) Urban Family : Such families generally dwell in cities. They have the following main characters - small size, low birth rate, higher age of marriage, secular outlook, freedom of women and less attachment to traditions.

On the basis of orientation and procreation

On this basis families are of two types :

(a) Family of Orientation : This is the family in which an individual takes birth. In this family along with the individual, his parents and siblings stay together.

(b) Family of Procreation : This is the family which an individual establishes or adopts after marriage. This family comprises his wife and children from the marriage. Any individual can be a member of either or both types of families.

On the basis of relationships

According to this criterion family can be either consanguineous or conjugal.

(a) Consanguineous Family : It refers to those families in which blood relatives stay together. In addition to husband and wife, other blood relatives also reside in the family.

(b) Conjugal Family : These families refer to the families in which marriage based relations are given more importance, i.e. husband, wife and their children. Such families are smaller in size and stable. The emotional and affectionate bond binding the members together is strong.

On the basis of religion

On this ground families can be categorised into three main groups :

(a) Hindu Family : In this type of family marriage is considered to be a compulsory and important ritual. Generally, it is monogamous family with joint family system. Culture and tradition have important roles to play in day to day life. The trend is now becoming towards nuclear family.

(b) Muslim Family : Marriage is considered compulsory in this type of family also. Mostly polygamous trend is seen in Muslim family. They are quite orthodox and women are strictly kept under veil.

(c) Christian Family : Monogamous families are a trend in this community where boys and girls are given equal importance.

On the basis of culture

Broadly speaking there are two types of cultures and therefore two types of families :

(a) Family with Western Culture : The western culture gives equal status to men and women. The work, the responsibilities and the rights are equally shared between husband and wife. The families are nuclear set up in most cases.

(b) Family with Eastern Culture : Mostly extended families are found in this culture. Rural families are common occurrence. Parents in old age are looked after by the family unlike in the western culture. They are closely bound to their culture and traditions.

Reasons for change in family types

Activity and change are ever present universal fact of life. It makes the society and its members progressive. And family being the nucleus of a society, a change in the family pattern will bring real change in society.

Changing Family Pattern : In the modem times, the speed of change is certainly many times ahead than that witnessed in the earlier times. The changes that have been observed in the families can be categorised in the following groups:

Changes in the Form of Families *:* The families in olden times had fixed role for women to do household work and for men to earn a living. Due to the impact of science and higher mechanisation, the physical work load on ladies has considerably decreased; as a result they have started going out to earn money. Therefore, they are now economically free of their dependence on men. This economic freedom and their being equally educated as men, has brought about another change in the family today. Another prominent change seen in the modern families is the ever decreasing impact of religion on family. The average family size too has considerably reduced. Blood relations today have less significance than those by marriage. The society now has greater number of nuclear families than joint families.

Changes in Functions of Families *:* The family today has changed role to play. The love between husband and wife is now exhibited more to the outside world. As for affection between children and parents, it too has increased. Because the number of children are less, parents pay more attention to them and have closer interaction with them.

Satisfaction of sexual desires had less importance previously but today this function has higher priority in the family. Dissatisfaction in this area may even bring about breaking of families in the present society which was not the case before.

The present day family has changed viz à viz Economic functions also. It is now an income generating group whereas it used to be a productive unit before. In the old type family most or all of physical work was done by various members of a family whereas today majority of the work is paid for and got done by people outside the family. Money is now spent in larger amount on luxuries, whereas previously only essential commodities were purchased, the rest of the income was spent in buying property or land.

Religious aspect too has taken a turn in the modern family. Little or no religious education is imparted to a child by the family today. Very few if at all, religious ceremonies are organised in the household. The members are free to observe and hold religious views of their own which may be different from those held by most of the family. In olden times, it was very difficult to break religious bindings.

Regarding the Educational functions of a family they have attained a much more significant position than ever before. Formal education has become a must for every child, though it was considered unimportant for girls previously. Professional training courses are considered better for practical life. Informal education regarding family traditions and culture which a child used to inherit from elder members in joint family, now it is almost non existent because the families are mostly nuclear and both parents are working.

Regarding the management of functions the whole of joint family used to be controlled by the head of a family. Today, in a nuclear family, decision making power lies equally in the hands of husband and wife. In traditional system, the decisions regarding education, settlement, profession, etc. were done by elders for children. Today, the children themselves choose their line of education, life partners and careers.

In traditional system, most health related problems were dealt by the old ladies with the household methods. Only some major problems were referred to the government hospitals. Today most health problems are given more attention and are referred to private doctors. General health and hygiene are more carefully tackled, as people have become more aware of their health.

Recreation in old times was neither considered necessary nor important. Whatever entertainment did exist, it was by the medium of folk music, animal fights, etc. Today, its significance and sources have increased tremendously. Radio, T.V., multi media channels, VCDs, clubs, fashion shows and many other alternatives are available for recreation of different age groups.

Reason for change in Family : Various aspects of society which when changed, leave an impact on other facets of society as well. They became reasons for bringing about change in the family types. These reasons are:

Economic Reasons

(a) Industrialization : The industrial revolution brought about many changes in the family. The family was in real sense a virtually self sufficient economic unit. But as a result of industrialization, what was done in every home started being produced in factories. Thus, the family was left to be a consumption unit only.

(b) Material standard of living : Previously, man used to think more on spiritual and religious lines and not of materialistic goods as today. The standard of living is gradually increasing and the things which were considered luxury at one time have now become a necessity for today's living. To acquire all this, man marries late, plans less children or marry for dowry or do overtime to earn more money.

(c) Economic independence of Women : It all started with industrial revolution. Most household chores became easier and were quickly accomplished by machinery, or were now done by outside agencies. Also contributory, was the fact that higher education is now given to girls as well. As a result of both these factors, women started going out of the house to earn money and became economically independent. This change brought about so many changes in the family.

Social Reasons

(a) Urbanization : Urbanization is the movement of rural population towards urban areas or cities. The rural families used to be joint, having a common occupation. As they moved to cities, their structure had to change because they had to adopt separate occupations for a living and also could not find big houses for a joint family to live in. This made them to break up into nuclear families with separate status.

(b) Mobility of Population : In order to maintain a good standard of living people prefer to move to a new place that offers them a better and more paying job. This causes mobility of a family.

(c) Education of Women : With the beginning of education of girls, their average age of marriage increased. With increased awareness and better personality they started choosing their life partners. With their education and increased independence, they have a say in family matters. Less number of children and increased rate of divorces are also an outcome of this.

(d) New sexual morality : In old times sexual morality had different standards for men and for women. But in modem times, moral code for men and women has become the same. Both are punishable for any offence.

(e) New direction of recreation : Most of the recreation today is sought outside the family from outside agencies like movies, clubs, bars, discos, video houses, etc. For this reason, members of a family prefer to stay out more and devote less time to each other.

Political Reasons

(a) Change in authority : Where father or head of family exerted a lot of power in the past today the father has less influence. Now the state has taken over a lot of responsibility of a family like education, health, etc.

(b) Women's Rights : Now women have a right to vote on the political front whereas previously they did not have a say even in their own homes. The woman now has right to inherit father's property by law. Women have a right to go to court against any crime against them. These reforms have strengthened the status of women in family, resulting in drastic changes in family patterns.

Philosophical Reasons

(a) In olden times marriages in our society were thought to be made in heaven. One has to bear (especially woman) whatever life partner she got in the arrangement made by their elders. Marriage was thought to be a religious binding, releasing

them from bondage only after death. But today the theory is changed, marriage is considered to be a contract which if and when unsuitable may be broken by either partner.

(b) The individual in olden times had very close ties with blood relations and even a person of the same village or town was considered as "One's own". This kinship is now nowhere to be seen. The most important figure in anybody's life is 'I' rather than 'we'. This has changed the very thinking and behaviour of man.

EFFECT OF FAMILY SIZE ON THE WELFARE OF MEMBERS

We have just studied the changed family patterns and the reasons behind them. One of the prominent changes seen in the modern families is the family size. The reason behind this change can be summarised as: education of women, late marriage, economic freedom of women, aspiration for higher standard of living, etc.

The effect of this change on various members of family is also equally important.

(a) The number of children are less. Therefore parents are able to pay more attention to them and their needs. Modern parents make too much fuss about their children regarding what they eat, what they wear, where they play and when they sleep, etc.

(b) The parents are more conscious of their children's health. Not only about the various preventive vaccines, but also their general health, weight, height, etc.

(c) Due to less number of children the economic burden on parent is less. Today the cost of living is higher than ever before. Raising and upbringing of a child is so expensive that only if number of children in the family is less then the parents give them a good life that is satisfactory to them also.

(d) The education, particularly the higher education is very expensive and middle class parents can hardly afford it for their children. A good education can ensure a

bright future for their children. Therefore this is possible only if the family size is reduced.

(e) Today the society has become very materialistic and status of a family is judged not by its moral and social values but by the standard of living they maintained. With the reduced family size higher standard of living is easier to maintain.

(f) Last but not the least, reduced family size has been a boon for the women of the family. Repeatedly bearing children used to break their health to a poor state. Today the mother's health status is much better than it was before. This also leaves an impact on the form of better managed families.

ROLE OF FAMILY MEMBERS IN ITS SMOOTH FUNCTIONING

Family is a very important social unit of any community. In fact it may be termed as the sole basis of a society. Without it the very existence of a society may be in danger.

A family is the place where the society starts its progress. The child takes birth in a family. This is where the child is introduced to emotions like love and security. The child opens its eyes and is introduced to the outside world through mother's love, sibling's affection and father's authority.

The social values and cultural aspects of the community are inculcated in the child from the time of birth within the family background.

The institute of family performs vast variety of functions which are important to the individual as well as to the society.

The significance of family as being essential in the progress of a community becomes all the more apparent if we think of children of broken homes or destitutes. Such children are psychologically unstable and emotionally insecure. They generally grow up to become misfits in the society. They are maladjusted and may even become bad elements of society.

Though it is argued by some that since many functions of family like education, health recreation etc., are being taken up by other social institutions, the importance of family is decreasing. Family remains the pivot of a society and the very building block of all communities.

UNIT - III
THE HOUSE AND ITS SANITATION

THE HOUSE

The house is one of the basic needs of human beings, all of us live in a house. There are many types of houses. It may be a hut in the village, a flat or bunglow in a city.

House can be constructed by ourselves, or we can purchase a readymade house. One can stay in a rented house also.

Functions of a house

In general terms, the word 'Home' and 'House' are used interchangeably. But there is a difference.

Basically a house is the physical construction made of brick, sand, cement etc.

A house becomes 'Home' when all the family members start living there with love and affection.

Thus a home is a very important place for all of us.

The following are the list of the functions of a home/house.

1. Protective : Home gives us protection from outside heat and cold, rain, wind and sun etc. Home also gives protection to small children and old people who need special care.

2. Educative : A child's basic education starts from home, which helps in the development of a child's personality. So a home is the centre of family life.

3. Affectional : Home is a place where all family members stay together with love and affection.

4. Social : A home facilitates meeting with other people and promotes social interaction.

5. Economic: Home facilitates income generating activities like weaving mayek naibi fanek, stitching and embroidery and any other similar activity. Families also save money by staying together and sharing everything available. The money thus saved can be more effectively utilised elsewhere.

6. Status giving : If you are staying in a home, you enjoy a particular status in the society.

IMPORTANCE OF LIGHT AND VENTILATION

Lighting : There are two types of lighting.

(a) natural light and

(b) artificial light

Natural light is that light we receive from natural sources i.e. the sun.

When we use artificial means such as kerosine lamps, candles, electric bulbs, tubes etc., to produce light, it is known as artificial light.

It will be proper that the rooms get some sunlight during the day. Because sunlight acts as a mild disinfectant, i.e. it kills germs and keeps the place healthy. It also heats up the rooms thus removes dampness from the rooms. Sunlight is more important for kitchen and bathrooms where water is mostly used. If sunlight does not reach these areas will remain dark and damp. It will attract the entry

of mosquitoes and cockroaches. It is not very hygienic to stay in such a house as well.

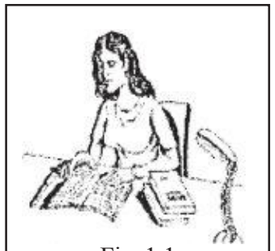


Fig. 1.1

While using artificial light, we shall see that it falls on the work that we are doing and not on our eyes. Light falling directly on our eyes will make them ache and water. For studying and other works, such as needle works etc. there should be adequate lighting. Otherwise our eyes will soon be tired (See Fig. 1. 1).

Ventilation : Fresh air is essential for healthy living. This is the reason why we must ensure that the house we live in has proper ventilation. Ventilation means making arrangements for fresh air to circulate.

Circulation of air is necessary because the carbondioxide that we breathe out is removed and the fresh air brings in oxygen to breathe in. So the windows of the house should be kept open. Ventilators can help circulation of air where there is no provision of windows.

There are two methods of ventilation

(1) Natural system of ventilation :

(a) Wind : Wind is a powerful ventilating agent. Wind forces itself into the room through open doors, windows, holes and openings as a result of the movement of natural air.

(b) Difference in temperatures : According to law of physics heat expands a substance and cold contracts it. If the air, of a room is heated, it expands and becomes lighter in weight. It then rises up and escapes through the openings and at the upper regions of the room. The outer cooler air rushes in through available opening at the lower region. Thus a constant current of air is maintained.

(c) Diffusion of air : Diffusion is the tendency of gases to mix when in contact. When doors and windows are open, the inside air and outside air mix and dilute the impurities.

Types of natural ventilation :

The openings through which ventilation is carried out are known as inlets and outlets.

Inlets are intended for the entrance of pure air. Doors, windows and openings in the walls serve as inlets. Doors and windows should be provided nearly opposite to one another and kept open so that fresh air can pass through the room.

Outlets are for the escapes of impure air and are usually provided near the ceiling so that warm impure air which is lighter in weight rises up and can escape from the room.

Chimney is an excellent and efficient outlet.

Ordinary ventilators placed in the wall near ceiling act as outlets for impure air.

Windows placed opposite to each other serve both as inlets and outlets.

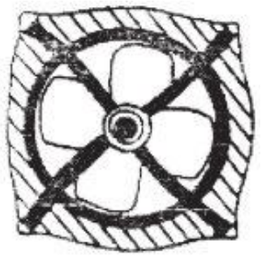


Fig. 1.2 Vacuum System

2. Artificial system of ventilation :

It is the method of ventilation in which special mechanical devices are used either to force the fresh air into the room or to extract the foul air from the room or a combination of both.

There are three main methods of artificial ventilation.

(a) Vacuum system: The air is drawn out by mechanical means like exhaust fans. These fans suck the air out of the room(See Fig. 1.2).

(b) Plenum or propulsion system : The air is driven into the rooms by mechanical forces like fans and blowers. The advantages of using this system are that temperature and amount of air required can be regulated and source of air can be selected. Air conditioner is an example.

The disadvantage is that sometimes fresh air is driven out.

(c) The balanced system : The combination of the vacuum system and the propulsion system is known as the balanced system. It is used for ventilating large houses and halls.

Advantages of artificial system are:

(i) The air can be purified, warmed or cooled as desired.

(ii) It is a quick method.

The disadvantage is rather expensive to install.

Effect of bad ventilation :

Headache, faintness, sickness and vomiting are often caused by foul air in rooms, public halls, schools, theatres and over crowded places and badly ventilated buildings. The health of children is more liable to suffer from the effects of bad air. People living in ill ventilated houses suffer from cold, cough, influenza, pneumonia, tuberculosis, skin trouble and eye trouble, indigestion, sleeplessness, debility and anaemia. Such people are not able to do mental or physical work, which require concentration and long working hours.

SANITATION AND DISPOSAL OF WASTE MATERIALS

It is important to keep our home and surroundings clean. Clean surroundings keep insects and germs of diseases away from us. In order to prevent the spread of diseases and to keep our home environment healthy, we must know some do's and don'ts. Such as ,

1. Cleaning of the house: The house must be cleaned everyday. We must sweep daily and mop the house with disinfectants. We must remove dust and dirt from

every nook and comer of the house. The cobwebs must be removed everyday. The furniture must be wiped off the dust everyday after sweeping.

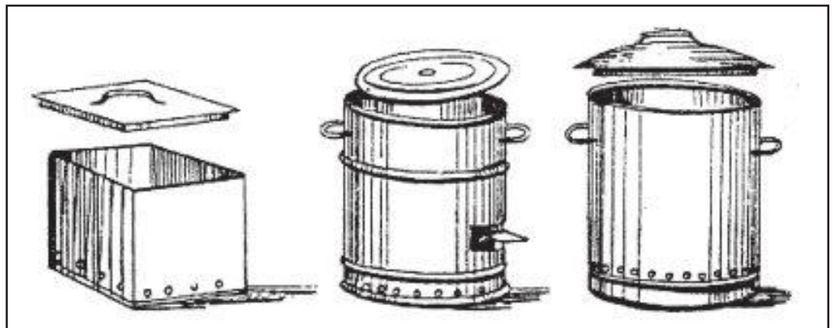


Fig. 1.3 Dustbin with a lid

2. Removal of the garbage : The garbage from the house, dust collected from sweeping, waste material like vegetable peelings etc. should be put in a covered dustbin. The dustbin should be emptied everyday and should be disposed off in the garbage bin. This prevents the garbage from pilling everywhere (See Fig. 1.3).

3. Disposal of waste water : Waste water from the bathroom, kitchen and washing should be led by a drainage pipe to a pit or public drainage system.

4. Disposal of human excreta- sanitary latrines : Hygienic disposal of human faeces and urine is necessary to prevent the spreading of disease. To use proper latrines is very important otherwise diseases may spread through walking barefoot, eating contaminated vegetables, flies sitting on food, drinking polluted water etc. Effluent coming out from the septic tank should be absorbed in a soft pit or pass on to the public sewage system.

Some of the ways of safe disposal of human excreta:

1. Water closet : The faeces and urine are carried away by a flush of water through a system of drains and sewers. A water closet is a sanitary installation for reception of the human excreta. It is connected to a sewer through a pipe. This system requires plenty of water and is expensive to construct.

2. Pit latrine : To receive human excreta a pit of 3 metres deep may be dug. Just to drain away the liquid portion of the excreta the soil should be sandy, otherwise the pit will get filled up quickly.

A platform around the opening of the hole will be constructed with raised foot stands. The openings of the hole should be covered with a lid to prevent flies attracted by smell.

3. Bore hole latrine : A hole to a depth of approximately six to seven metres and a little less than half a metre in diameter is dug deep into the ground. The opening of the hole is covered with a concrete slab. A squatting plate is fitted.

When the hole gets filled with excreta, leaving a half metre from the top, the hole should be filled up with dry earth. The concrete slab and the squatting plate which should be removed for reuse and the slab and the squatting plate which have been removed should be fitted over a freshly dug bore hole.

4. Sulabh Shauchalaya : The latest development in the safe disposal of human excreta is the pour flush latrine with two pits popularly known as Sulabh Shauchalaya. It was developed by Dr. Bindeshwar Pathak.

Construction of Sulabh Shauchalaya :

Two pits are constructed one metre apart. Only one pit is used at a time. When one pit is filled up, it is closed and the other pit is used. After 2-3 years, the first pit is cleaned and is ready for reuse.

It has many advantages. Few of them are:

(i) Low cost and easy to construct with locally available material

(ii) Very hygienic

(iii) Free from foul smell

(iv) The sludge from the pits is a good manure

(v) Vent pipe is not needed as gases are dispersed into the soil

CARE OF SURROUNDING

Besides proper disposal of waste there are certain health habits to ensure good health. Good health habits help to keep the environment neat and clean, thereby minimising the spread of disease. Some of the healthy sanitary practices which all individuals should observe at home and public places are:

1. To keep the surrounding area clean by not throwing out the garbage indiscriminately here and there.
2. To prevent breeding of mosquitoes by preventing water from collecting and stagnating.
3. To cover nose and throat when sneezing and coughing.
4. Not to spit on the roads and in public places.
5. To disinfect patient's cloth and wash at home.
6. Not to eat from hawkers who sell food which is exposed to flies and dust.
7. To wash fruits and vegetables before eating.
8. Not to use public towels (towels in the bathrooms of restaurants and other public places).

UNIT - IV

SAFETY IN THE HOUSE

Safety in the house

The loss of life and property in the house is far greater than is commonly realized, unless precautions are taken to assure safety and protective measures in the home. There are many chances of loss and hazards to life. Carelessness coupled with the ordinary hazards around the house can quickly bring about an accident. Some sort of violent and irrational behaviour breeds many accidents.

No one wants to be thinking of safety at all the time. It is better to set situations for everyday living so that there are as few hazards as possible, and to learn and practice habits that will carry us through the day with the fewest possible risks. Good habits save time, they also save lives at home, on the job, and at school.

Accidents in and outside our homes cause deaths also. Among persons in the 15 to 20 age group, most deaths are caused by fire burns, with fire arms coming a close second. Burns also rank first among children and in all age groups up to 65. Among older persons are common falls from stairs, suffocation by bed clothes, pillows etc.

Prevention of Accidents in the house

Most of the accidents, accidental deaths and injuries are caused by carelessness. Conditions that trigger the high rate of accidents, include the age,

mental and physical status of the individual, environmental hazards and the failure of the victims to recognise these hazards.

Prevention of home accidents, requires a co operating family that works together in checking out every possible condition that might cause an accident. When such action is followed by correcting and eliminating all potential hazards you can have a safe home environment and a family dedicated to prevention of accidents.

Fires and Burns

Burn and fire accidents are frequently seen or heard about in homes. Many deaths due to burns at home occur and involve people over sixty five or under five years of age. Fatal fires in the home can be caused by placing combustible material too close to an open fire, going to sleep while smoking, starting fires with flammable liquids, using defective electric equipment, children playing with matches, leaving rubbish fires unattended, overloading electric circuits, using defective wiring and carelessness in the storing of petroleum products.

Leaving children unattended brings in tragic results. Little children trapped in a burning building find it difficult to escape. Fatal accidents caused by fire could become less numerous by practising the following :

(a) Avoiding smoking in bed, or when sleepy, or while lying down.

(b) Putting out every live cigarette or cigar butt before discarding it.

(c) Always breaking a match in half before throwing it away.

(d) Keeping matches in covered containers, inaccessible to children and to rodents.

(e) Safeguarding young children against fire.

Poisons

Many people die each year from accidentally ingesting solid or liquid poisons. Most of these are under five years of age. Children seem to have an

affinity for finding poisons under the sink, kitchen shelves, on bedside or living room tables, in bathrooms, medicine closets, out houses, back porches and garage.

To prevent anyone, children in particular from accidentally taking poison, one should always:

(a) Keep all medications and poisonous substances either locked in cabinets or stored on high shelves.

(b) Keep all poisonous materials in their original container; they should never be stored near or with food.

(c) Destroy poisonous substances and prescriptive drugs after they have served their purpose.

Gases

Deaths, by accidental inhaling of poisonous gas occur in fatal gas poisoning. This happens many times when coal is burned in the fire place or an 'Angithi' and the smoke coming out does not escape as all doors, windows are locked. Inhalation of vapours of volatile solvents or aerosols can have fatal results. Certain household cleansing solution and insecticides are particularly hazardous. When using these materials, it is very important to have adequate ventilation in the area in which one is working.

Electricity

Electricity is essential for good living, but when carelessly used, it can shock, burn and kill. The following precuations are necessary for the safe use of electricity in house.

(a) Never to overload a single circuit.

(b) Not to permit appliance cords to lie across radiators or pipes.

(c) Not to touch any form of electric appliance while bathing, standing in a puddle of water, or if hands are wet.

(d) To avoid placing electric cords under rugs or indoor jams.

(e) Not to have an electric iron connected and unattended.

(f) To pull out plugs from sockets by the plug, not by the cord.

(g) Not to permit children to chew on or play with electric cords.

Glass Doors

Walking into glass doors causes multiple injuries to children and adults. These injuries range from a bump on the nose to severe hemorrahage and death. If there are glass doors in the home make sure they are made of safety glass and are marked by easily seen devices.

Precuationary measures in the house

Many home accidents can be avoided by taking some precuations. We should -

(a) Light stairways well; provide handle rails for stairways; paint edges of steps and bottom step with contrasting colour: do not leave toys or other objects on stairs.
(b) Keep electric cords in good condition; protect fans and heaters.
(c) Keep knives, garden tools, broken glass, boiling water, open fires, matches and medicines out of the reach of children.
(d) Keep poisons in plainly marked containers, out of children's reach.
(e) Be careful of swinging doors.
(f) Blow matches outside carefully, be sure that cigarettes are snuffed out and put in safe container.
(g) Not to use petrol or flammable cleaning fluids indoors.
(h) Do not start an automobile in a closed garage.
(i) Be sure, guns are unloaded and out of reach from children.
(j) Arrange bed clothes so that babies cannot get blankets and pillows over their noses.
(k) Keep small objects that might stick in the wind pipe away from babies.

First Aid

Accidents can occur anywhere, at home, on the road, in the school, while playing or doing some experiment in the laboratory, etc. When these calamities occur, they need immediate attention in order to prevent further damage. Before actual medical aid can be secured, something had to be done to the injured person. A doctor is not always available on the spot, he has to be sent for. If nothing is done between the time of the injury and the arrival of the medical aid, the injury or the accident is bound to have disastrous effect. The treatment given on the spot is called First aid. It is the treatment in emergency.

Scope of first aid

First aid is an emergency treatment. It has the following ranges of action:

(a) It determines the nature of the case requiring attention.

(b) It decides the character and the extent of the treatment.

(c) It includes the arrangement to take the injured person to either home or to hospital.

Certain Basic Requirements of the First Aid

(a) The first and foremost thing to be remembered is that first aid should be given quickly and without any fuss or panic. This means that the person who gives the first aid treatment should be skillful, resourceful, calm and controlled.

(b) People should not be allowed to make a crowd round the patient.

(c) A first aid box or kit should be kept handy which contains all the necessary equipment that is required for instance, antiseptic lotion or cream, cotton guage, band aids, scissors, certain medicines, which are commonly required, glucose or Glaxose D, etc.

(d) An atmosphere of reassurance must be created not only for the patient, but others around should also be assured of proper treatment.

(e) If breathing has stopped, artificial respiration must be given.

(f) The patient must be saved from shock.

(g) Clothes should be removed when necessary.

(h) Immediate arrangement should be made to remove the patient to a hospital or a doctor.

First Aid treatment for-

Cuts : The aims in the treatment of cuts are to stop the flow of blood and to prevent blood poisoning which may result in tetanus.

A slight clean scratch or cut requires nothing more than an application of tincture of iodine. The bleeding is only from capillaries which soon close when the blood dries. If the wound is dirty, wash it with boiled water and clean with cotton wool. Wash the surrounding skin away from the wound and not towards it. Apply tincture of iodine, which is a great safeguard against germs, and bandage with a pad and soft cloth to keep out any dirt.

Bleeding is more serious in deep wounds where an artery or vein may be cut. Blood from an artery is bright red and flows in jerks as the heart beats. Venous blood is dark red and flows evenly.

Make the patient lie down. Raise the limb if there is no fracture. Put a hard pad of clean rag or lint on the wound and bandage tightly. Venous bleeding often stops in this way. If it does not, pressure must be applied by means of tight bandage on the vein close to the wound, on the side away from the heart.

If the bleeding is arterial, pressure must be applied on the artery on the side of the wound nearer the heart.

Pressure on a vein or artery applied by pressing a finger, although efficient, cannot be maintained for a long time. A tourniquet is a device for applying pressure on an artery. It consists of a hard pad and a bandage which can be twisted tight by means of a stick. We can easily improvise one in case of an emergency by tying a

knot in the middle of a handkerchief or a piece of cloth, applying it to the spot where pressure is needed, bringing the ends round the limb, tying a reef knot pushing a stick under the knot and twisting it until the bandage is sufficiently tight. To prevent its untwisting, one end of the stick may be tied to another part of the limb.

Remember that such tight bandaging should not be left on for longer than 20 minutes, less circulation to that part of the body should be completely cut off and the limb begins to die. Apply the tourniquet and fetch a doctor at once. If after 20 minutes the doctor does not come, loosen the tourniquet slightly, see whether bleeding has stopped and if necessary, retighten the tourniquet. For severe bleeding of the palm, remove the foreign bodies like glass that may be present, place a clean pad over the wound, bend the fingers over it, and strap the hand with the elbow bent, to the upper arm. When the wound has been suitably pudded or bandaged raise the part to decrease the bleeding.

When the artery in the neck is wounded, as a cut in the throat, apply the thumb of one hand on the artery and press on the backbone taking care to avoid the wind-pipe. Maintain the pressure until the doctor arrives. Wounds in these cases only consist in keeping the patient in a comfortable reclining posture until the doctor comes. The edges of the wound can be held together. Give nothing to drink, cover the wound and keep the patient quiet.

Bruises result from injury to the tissues under the skin. The blood rushes to the spot but as the skin is not broken it does not flow out. The part becomes discoloured. Apply a cold compress and renew when warm; protect from further injury by a bandage.

Bruises : Bruises or swellings in the skin are caused by blows, knocks and bites of insects. They should be treated with cold water or iced dressings. A doctor should be consulted in case of persistent swellings.

Burns and Scalds

Burns are caused by dry heat like that of a flame, a hot saucepan, etc., while a scald is due to moist heat as from steam, hot water, etc. Treatment is similar for both. Care must be taken of the smallest scald or burn as there is always a danger of blood poisoning and shock, which may cause sudden collapse. If there is medical attention nearby, cover with cotton wool and bandage lightly, before taking the patient to the hospital or before the doctor comes.

Sometimes the burn is so deep that the skin and the flesh under it are destroyed. Burns which are deep though small, are much more serious than those in which a large area is affected. Both cases should always receive medical attention.

Remove the clothing gently, cutting around places where it is stuck to the skin.

Never break any blisters, otherwise it may cause blood poisoning.

Cover the burn with strips of lint or cloth soaked in a solution of 2 teaspoonfuls bicarbonate of soda, to 1 pint of warm water or in strong warm tea. Do not use oil as this increases the danger of blood poisoning. Until this is ready, soak the part in warm water to which bicarbonate of soda is added to exclude the air. Add three teaspoonfuls of soda to three cups of water.

Fire

When a person's clothes are on fire, he/she must not run for help. Running causes a draught which will only increase the flames. The victim should lie down and roll on the ground, wrapping, if possible, with a blanket, or any thick cloth, to put out the flames. Also, this prevent the flames from reaching the face. Standing up will only let the flames rise up to the face just as when you hold a struck match downwards, it burns with a bigger flame. When the victim lies down, the flames still burn upward but into the air and do not spread to the rest of the victim's clothes and face. After the flames are put out, fetch water to put out the smouldering fire. Treat for sock and burns.

Poisoning

Poisons may be divided into two classes, corrosive and non corrosive poisons. Corrosive poisons include strong acids such as sulphuric acid, and strong alkalies such as caustic soda. These poisons burn the parts by corrosion of the mouth and possibly retching, difficulty in breathing and collapse.

Non corrosive poisons include irritant poisons such as arsenic, poisonous berries and fungi, and decomposing food. These cause irritation in the throat and stomach and retching generally accompanied by colic and diarrhoea.

Also there are hypnotic poisons, such as opium and datura, which at once induce a tendency to sleep followed by stupor and later coma. Pupils of eyes become contracted and are known as pin point pupils.

Deliriants, such as stramonium, belladonna and alcohol produce delirium, developing later into coma. Pupils are dilated. Convulants such as strychnine produce convulsion between which the patient is in a state of profound collapse; when a case of poisoning is discovered, send for a doctor immediately telling him, if possible, what kind of poison has been taken.

If the mouth is burned do not give an emetic to make the patient vomit as this increases the pain and effect of the burning. Give an antidote which will neutralize the poison.

For acid poisons, give alkaline antidotes such as lime water in large quantities or a tablespoonful of chalk, whitening or magnesia in half of pint of water frequently.

For alkalies, give one of the following acids, vinegar or lime juice in an equal quantity of water tumblerful. If these antidotes are not rapidly available or if it is not known whether an acid or alkali poison has been taken give copious droughts of cold water or milk.

If the lips and mouth are not burned, give an emetic and try to get rid of the

poison by giving lukewarm water or 2 tablespoonfuls of salt in half a pint of lukewarm water. Repeat every few minutes until vomiting occurs. If an emetic is not immediatly available induce vomiting by putting two fingers to the back of the throat.

In the case of corrosive poisons apply a hot compress to the front of the neck and give butter or oil such as olive or salad oil, or liquid paraffin or barley water or gruel to relieve the pain.

In cases of irritant poisons, after the emetic has worked, give 2 tablespoonfuls of castor oil to an adult and 2 teaspoonfuls to a child. To relieve pain give oil or barley water or gruel.

In cases of hypnotic poisons keep the pateint awake. Give strong black coffee freely.

In cases of convulsant poisons an emetic can only be given and artificial respiration must only be attempted between the convulsion.

In all cases, give milk, raw eggs beaten up with milk or water, cream and flour beaten up together, or strong tea.

Preserve any vomited matter, food or other substance suspected of being the poison so that the doctor may examine it. Do not wash vessels which may have contained the poison but guard them carefully.

Shocks

It is a state of circulatory collapse, nervous tension, and at times unconsciousness.

Depending on the cause, shocks are classified as nervous, haemorrhagic, toxic and electric. They may come on singly, or one form may lead to another and thus produce a combination of forms. Further the degree of shock may be aggravated by the age, consititution, mental make up and emotional maturity or otherwise of the patient. Shocks also vary in appreciable degree according to the circumstances, or the type and severity of the factors which induce or cause them. It is common cause of death though the patient is not killed outright in an accident.

Nervous shock sets in fast and produces just giddiness or complete unconsciousness. A sudden fall in blood pressure leading to draining of blood from the brain is a characteristic feature of the nervous shock.

Haemorrhagic shock is usually preceeded or accompanied by nervous shock and most of the symptoms are similar. The patient will have a desire to consume large quantity of water but suffers from nausea if fluids are administered to quench the intense thirst.

Serious injuries such as crushing compound fracture of large bones or the spine and severe burns produce toxic shock, especially when infection supervenes in the injuries. This type of shock is due to production of a poisonous substance called toxin which gains entrance to the blood stream, or to the loss of fluid from the blood into the tissues.

Electric Shock

Prompt and intelligent action is called for, in case of electric shock, as delay may prove fatal. If the patient is still in contact with the live conductor, before attempting to free him the current must be switched off. In case this is not possible the rescue worker must stand on a dry, thick wooden board, or rubber mat and pull the patient away. In case of electric shock the patient usually becomes unconscious and struggles for breath as respiration is partially or even wholly suspended. If breathing has stopped, artificial respiration should be resorted to. After restoration of normal breathing, treatment for any burns sustained by the patient may be given.

Treatment of shock

Shock is dangerous as it takes a large toll of lives. It is a wrong notion that its treatment should commence only after the local injury has been attended to fully. Immediate steps should be taken to counteract it.

The patient should be removed from crowds or from a stuffy atmosphere. Excepting in the case of severe injury to the spine, he should be made to lie on his back. The head and shoulders should be kept low. The legs should be kept raised unless they are injured. Tight clothing should be lossened and wet clothing, if any removed. The patient must be allowed fresh air. The patient's face should be sprinkled with cold and hot water alternatively. Any visible bleeding should be arrested and injuries treated. If the pulse is weak the palms and soles of the patient should be rubbed vigorouly. Artificial respiration should be given if breathing is faint or has stopped. The patient should be kept warm, wrapped in thick blankets.

Apart from this attention to the physical conditon of the patient, a psychological approach should also be made. Soothing and reassuring words should be spoken to the patient, encouraging him to think lightly of his injuries and no undue fuss should be made over his physical malady. No one should be allowed to discuss his condition within his hearing. The patient should be shielded from any emotional excitement or worry.

Bites

Immediate application of iodine solution prevents the entry of germs through the punctured skin. If there is a swelling and pain, hot fomentation is beneficial. Washing soda solution soothes the irritation produced by the stings of wasps and other insects.

The bites of dogs, cats, etc. must be treated at once with iodine, a doctor consulted and the animal kept under observation.

If the animal is suspected of having rabies every effort must be made to induce bleeding so as to wash out the poison.

Immediately, place a constriction between the bite and the trunk tight enough to cause congestion and promote bleeding but not so tight as to stop the arterial circulation. Keep the limb low and bathe the wound in warm water to which crystals of permanganate of potash have been added.

Give brandy or whisky or hot black coffee to stimulate the heart. If doctor is not available immediately, cauterize the wound by applying a fluid acid, such as carbolic or nitric acid with a match stick or a piece of wood sharpened to a point. Press well into every part of the wounds. Cover with a dry dressing, bandage lightly and then go to the doctor. If the animal turns out to be mad, the doctor will give antirabies injections known as the Pasteur treatment. Anyone who has been near or touched a dog that goes mad should have this treatment as a precaution.

Some insects such as scorpion uses its sting to the victim. A scorpion sting is vey painful, the nearest doctor will give an injection of cocain which will immediately relieve the pain.

Poisonous snakes are numerous in our country, the commonest varieties being the krait, the cobra and the viper. When a poisonous snake bites a person, it injects poison into the blood of its victim. The blood quickly carries, the poison to the heart and the brain and death follows. To prevent death, therefore, the poison must be kept from spreading all over the body along the veins and from reaching the heart. Pressure is required on the veins between the wound and the heart. Finger pressure can be applied at once, followed by a tourniquet placed as near the heart as possible, before the finger is released. After this has been done, we must encourage the wound to bleed. Hang the injured limb down, keeping the injured part low. If the wound is sufficiently big, warm water poured on it will encourage bleeding; otherwise some little cuts parallel to each other, can be made over the bite with a clean penknife and crystals of potassium permanganate rubbed over them. Potassium permanganate destroys snake venom if it is quickly brought into contact with it. Burning or cauterizing the bite with caustic potash, strong nitric acid, carbolic acid or a red hot pieces of iron, burns the poison as well and destroys it.

Fractures

Fractures are the result of broken bones. Setting a fracture consists in bringing the broken ends together and putting the limb in splints or in plaster of paris for some weeks. The bone tissues develop at the ends and they join together. This should only be done by a doctor. All that a lay person can do is to make the injured person comfortable and ready to take to the nearest doctor by applying suitable supports to the broken limb without dislocation of the broken bones. If the thigh bone is broken, placing the person on his feet to stand or dragging him on to a car, these rough movements will cause the broken bone to pierce through the muscle and skin and may make a much more serious wound than a fracture.

A fracture is simple when only the bone is broken into two pieces with no external injury to the skin. When the bone comes through the skin, injuring the muscles and blood vessels and causing a deep wound, or the bone is broken in more than two parts it is called a compound fracture.

We can easily discover a fracture because of the great pain and swelling, a bend in the bone where there is no joint, loss of power and grating of the broken ends of the bone. The limb cannot be used. But never look for the grating sign by medling with the broken bone. It will make the fracture worse.

With great care and without using force, place the limb in as natural a position as possible and apply splints to give support and render the limb immovable. Make the patient as comfortable as possible. Apply a firm bandage to the joint. Keep the bandage wet with cold water. When this ceases to give relief take the bandage off and re apply it. Keep the limb at rest. Umbrellas, strong sticks, bats, rulers, etc. can be used as splints. A broken leg can be tied against the sound leg for additional support. A broken arm after applying a splint may be supported on a sling.

If there is a compound fracture, treat the wounds as you would treat any other cut, washing it, applying iodine and bandaging before applying the splint.

Dislocation

Dislocation occurs when bones forming a joint are pulled apart by some sudden force, e.g. dislocated shoulder or jaw bone. There is at once a painful swelling and joint cannot be used. Never meddle with a dislocation. The only thing to do is to apply a sling for support and leave the rest to the doctor. Cold compresses may be applied to relieve the pain.

Drowning

When a person gets drowned, water gets filled in the stomach and lungs. In such cases the person not only becomes unconscious but respiration is also affected.

The clothes of the person should be taken off and his face should be placed downwards and his feet should be raised. This helps the water to come out. Artificial respiration should then be resorted to. If his mouth has closed, it should be made to open. He should be made to lie with face towards the ground and then his waist should be pressed with both hands. He should be dried with towel, wrapped in some warm garment and some hot beverage must be given to him.

Mouth to mouth breathing

Mouth to mouth breathing is an emergency life saving method of respiration. When a man cannot breathe due to drowning, gas poisoning, electric shock, head injuries and poisoning due to alcohol, opium etc. one has to resort to artificial respiration and for many cases mouth to mouth respiration is the only answer. For this, the patient is placed in the supine position. The air passages are cleared by turning the head to one side, and the patient's mouth is opened and cleared of water, saliva, mucus or blood. The chin is held up forward with one hand and nostrils are pinched with the other. The person who is giving respiration takes a deep breathe

applies his mouth to that of the patient and the breathe blown into his mouth until the chest of the patient moves up indicating that the lungs are filled up. Once the chest has moved up, the mouth is withdrawn and the chest is allowed to shrink back. This process is repeated every three or four seconds till the patient begins to breathe again.

Nose bleeding

Treatment : Tilt the head slightly forward to prevent any blood from being swallowed or inhaled. Gently squeeze the nostrils and continue to apply pressure for about 20 minutes till then let him breathe through the mouth. Leave the nostril and give ice cubes in the mouth to hold it under the upper lip. The cooling will first slow the flow of the blood and than stop it. If nose bleeding has been caused by accident then keeping ice pack or a bag of frozen corn at the bridge of the nose will reduce swelling.

QUESTIONS

1. Select the correct alternatives -
   (i) Home Science means
      (a) The science of doing work at home.
      (b) The art of managing your resources.
      (c) The art of decorating your home.
      (d) The science of managing a home.
   (ii) Home Science is important for
      (a) Taking care of the children.
      (b) Imparting good values of life.
      (c) Leading a healthy family.
      (d) Managing the home.

2. Write three lines on why you think study of Home Science is important for every young person.
3. What are the various constituent areas of Home Science ? What are their sub divisions.

Short Answer Type Questions

1. Define family.
2. Name any four types of family.
3. What do you understand by the welfare of the members of a family ?
4. What is the importance of family towards mental development and education of its members ?
5. Define Hindu family on the basis of marriages.
6. Define Muslim family with reference to system of marriage.
7. Mention important characteristics of a western type family with reference to marriage and culture.

Long Answer type of Questions :

1. "There is a change from joint Family system to Nuclear Family system." Do you agree ? Explain giving reasons to support your views.
2. Mention various reasons for changes in type of family.
3. Explain the importance of family in respect of education and health of its members.
4. Some of the functions which were being looked after by the family are now being attended to by social institutions. Is it going to affect the importance of family ? Explain with reasons.

5. Mention different types of family systems. What are the significances of various family systems ?

6. Examine and explain the effect of family size on the welfare of its members.

7. How does the size of family affect the society ? Mention the advantages of small family (i.e. nuclear family) and joint family systems.

8. State any three functions performed by your own home.

9. Examine your home whether there is adequate ventilation. If not suggest two ways in which ventilation can be improved.

10. What will be the effect of poor lighting in your home on your health ?

11. Tick mark (✓) the most appropriate answer:

(i) In case of the pit latrine, the pit should be

(a) More than three metres deep,

(b) Less than three metres deep,

(c) Exactly three metres deep,

(d) None of the above.

12. Match the items in column A with set of colunin B.

A	B
(i) Natural light	(i) Bulbs and tubes
(ii) Artificial light	(ii) Sunlight.

Short Answer Type Questions

1. How would you render first aid for the following:

(a) Cuts

(b) Bruises

(c) Burns and scalds

(d) Poisoning

(e) Shocks

(f) Bites

(g) Fracture

LongAnswer Type Questions

1. Explain the Scope of Basic requirement of first aid.

2. Write the general procedure for the prevention of accident in the home.

UNIT - V

FOOD AND ITS RELATION TO HEALTH

Definition of Food : Food is that which nourishes the body. Food may also be defined as anything eaten or drunk, which meets the need for energy, building, regulation and protection of the body. In short, food is the raw material from which our bodies grow and are sustained. Intake of the right kinds and amounts of food can ensure good nutrition and health, which may be evident in our appearance, efficiency and emotional well being.

Defintion of Nutrition : Nutrition has been defined as food at work in the body. Nutrition includes everyting that happens to food from the time it is eaten until it is used for various functions in the body and passed out as faeces. Nutrients are components of food that are needed by the body in adequate amounts in order to grow, reproduce and lead a normal healthy life. There are over 40 essential nutrients supplied by food, which are used to produce literally thousands of substances necessary for life and physical fitness.

The study of the science of nutrition deals with what nutrients we need, how much we need, why we need these and where we can get them.

Nutritional status is the state of our body as a result of the foods consumed and their use by the body. Nutritional status may be good, fair, or poor.

CLASSIFICATION AND FUNCTIONS OF FOOD ON THE BASIS OF NUTRIENTS AND FUNCTIONS

The food which we use daily include rice, wheat, dal, vegetables, fruits, milk, eggs, fish, meat, butter, oils etc. The nutrients found in foods are - proteins, carbohydrates, fats, minerals, vitamins and water.

PROTEINS

Composition : Protein foods are composed of mainly Carbon, hydrogen, oxygen and nitrogen. It is of prime importance in the maintenance and growth of cells.

Source : Proteins are divided into animal and vegetable proteins according to their source. Animal proteins are obtained from meats of all kinds, egg, fish and milk product. Vegetable proteins are obtained from pulses, grams, seeds, nuts, cereals and vegetables.

Function : Proteins have the following important functions Promotion of growth, repair of wear and tear of tissues, production of metabolic and digestive enzymes and blood proteins, production of hormones, production of antibodies i.e. building up the body defences against infection.

Nutritive Value of Proteins : Proteins are composed of simpler substances known as aminoacids. Proteins differ from one another in their aminoacid composition. Out of 22 aminoacids commonly occuring in proteins, 10 are essential, in the sense that they are necessary for growth and must be present in food proteins. The nutritive value of protein depends upon its aminoacid make up. Accordingly proteins may be broadly classified into three groups.

1. Complete proteins : Proteins which contain all the esential aminoacids in adequate amount and which can promote growth and maintain life e.g. proteins of milk, eggs, meat, fish, liver etc.

2. Partially complete proteins : Proteins which are lacking in one or more essential aminoacids and which will promote only moderate growth but can maintain nitrogen equilibrium in adults are called partially complete proteins e.g. proteins of cereals, pulses, nuts and oil seeds.

3. Incomplete proteins : Proteins which are completely lacking in one or more essential aminocids and which neither promote any growth nor maintian nitrogen equilibrium in adults are called incomplete proteins e.g. gelatins.

Effect of Protein Deficiency : Deficiency of protein manifests itself in different ways in the infant and the adult. The infant loses weight, shows stunted growth and may succumb to infections. After weaning prolonged deficeincy of proteins may cause a condition known as Kwashiorkor which is charaterized by :

(i) Impairment of growth, (ii) Irritability, (iii) Oedema which may involve the whole body, (iv) Dry, lusterless, discoloured hair, (v) Dry, lusterless skin which may show cracking and pigmentation, (vi) Diarrhoea, (vii) Anaemia, (viii) Reduced resistance to infection, (ix) Enlarged liver which may develop into a condition known as cirrhosis resulting in the death of the child.

In adults, deficiency of proteins in diet causes:

(i) Loss of weight, (ii) Anaemia, (iii) Reduced resistance to infections, (iv) Oedema of the feet and accumulation of free fluid in the abdomen.

Protein requirements : The protein in the diet should be derived from different sources such as cereals, pulses, nuts and oil seeds, and flesh food. Since animal proteins possesses, in general, a higher nutritive value than vegetable proteins, the diet of children, expectant and nursing mothers in particular, should contain large amount of proteins derived from milk, egg and flesh foods. The protein requirement depends upon age and physiological state. The protein requirement of an adult can be met by consumption of a combination of cereal, oil seeds and pulse protein. For children and pregnant women however about 25-50% of the dietary proteins should

be derived from milk and other animal foods. Milk is by far the best source of animal proteins, as it supplies besides proteins other dietary essentials like calcium and vitamins of the B group.

The ICMR (Indian Council of Medical Research) has recommended 1.0 gm of protein per kilogram of body weight for a healthy adult, but this varies with different growth periods and physiological stages. 1 gm. Protein yields 4 calories of heat.

Recommended Dietary Intakes of Proteins

Particular of the Individual	protein gm/day
Man (55kg. body weight)	55
Woman (45 kg. body weight)	45
Woman, Pregnant (latter half of Pregnancy)	+ 14
Woman nursing mother (0-6 months of lactation)	+ 25
Infants 0-6 months	2.0 gm/kg/day
Infants 7-12 months	1.7 gm/kg/day
Children 1-3 years	17-20
Children 4-6 years	22
Children 7-9 years	33
Children 10-12 years	41
Boys 13-15 years	44
Boys 16-18 years	60
Girls 13-18 years	50

CARBOHYDRATES

Chemical Composition : All carbohydrates are made up of carbon, hydrogen and oxygen. The ratio between the number of hydrogen and oxygen atoms in their molecules is always 2:1 i.e. the same as that of water. It is because of this peculiar composition that these compounds are called carbohydrates which means hydrates of carbon.

Classification : Carbohydrates are classified as Monosaccharides, Disaccharides and Polysaccharides. Monosaccharides (mono or one, saccharides or sugar containing) e.g. glucose. Fructuse is the simplest form of carbohydrate. Disaccharides contains two sugars linked together to form a chain e.g. cane or beet sugar (sucrose), milk sugar (lactose) and malt sugar (maltose). Polysaccharides (poly many) are made up of long chains of sugar e.g. starch, cellulose, hemicellulose etc.

Sources of Carbohydrates : Cereals are the most important sources of carbohydrates. Roots and tubers are next in importance. Pulses and fruits are moderate sources of carbohydrates. Certain amount of carbohydrates is being consumed in the form of pure sugar or jaggery.

Function : Carbohydrates serve as the main source of energy to the body. When consumed in excess; they many be converted into fat and stored in the body. For the normal oxidation of fats some carbohydrates are necessary. Carbohydrates regulate fat metabolism. They play a very important role for the gastro intestinal functions of the mammals. These foods add variety, flavour and bulk to diet.

Carbohydrate deficiency in diet is not likely to occur except in times of food shortage. Cereals, roots and tubers which are rich in carbohydrates are the cheapest of foods. The carbohydrates present in foodstuffs include starch and the various sugars.

Carbohydrates Requirement : Carbohydrates supply 50-80% of the calories in the diet, depending upon the economic status and age of the individual. In a balanced diet, about 50% to 60% of the energy in the diet is supplied by carbohydrates.

FATS AND OILS

Chemical Composition : Fats are an essential part of our body, accounting for one sixth of our body weight. The cells and tissues of our body have fat as an integral part. The vital organs such as, brain, heart, liver etc. are protected by a layer of fat. The nerves are also protected by fat. The fat around the joints serves as a lubricant and allow us to move freely.

Lipids is an overall group, which includes all fats and related compounds. Lipids is derived from the Greek word Lipos which means fat. Fats are composed of carbon, hydrogen and oxygen. They are also energy producing foods, but have a higher caloric value. Animal fats as a rule are mostly semi liquids under ordinary conditions. Vegetable fats are mostly liquid and are called oils. Fats are lighter than and insoluble in water.

Sources : Fats are obtained from vegetable oils, oilseeds, nuts, milk, ghee and fatty meat.

Function : Fats serve as a source of energy along with carbohydrates and are stored in the body beneath the skin (subcutaneous fat) and to some extent in other parts of the body. Fats in the diet serve as a carrier for the fat soluble vitamins (A, D, E and K). Fats also supply certain essential fatty acids which are needed by the body.

Effects of Deficiency : No specific effects of the fat deficiency are known in human beings. Even in the absence of fat in the diet the carbohydrates and proteins are converted into fat to some extent. But prolonged deficiency of fat may cause the following effects :

1. Dryness of the skin
2. Secondary deficiencies of fat soluble vitamins (A, D, E and K)
3. Since the essential fatty acids are not being supplied eczema like skin conditions may develop in certain individuals, particularly in children.
4. Deficiency of essential fatty acids may result in flaky skin, development of itching sores on scalp and retardation of growth.

Requirement of Fats : No standards for the requirements of fats are available. The following approximate fat requirements may be useful in formulating balanced diets.

Adults : 15- 25 percent of total calories from fat.

Children : 20-30 percent of total calories from fat.

Infants : 30-40 percent of total calories from fat.

MINERALS

There are about 30 mineral elements present in the body. Out of these, the following are essential for the proper functioning of the body -calcium, phosphorous, sodium, magnesium, iron, manganese, copper, iodine, cobalt and zinc.

Calcium : There are more calcium in the body than any other mineral. Most of it is found in combination with phosphorus in the bones and teeth. Calcium is necessary for the normal clotting of the blood and functioning of the muscles. Adequate amount of calcium is needed for the growth of children. If sufficient amount of calcium is not deposited in the growing bones, they will become soft and easily bent, thus resulting in rickets. When the diet does not supply enough calcium, it is withdrawn from the bones into the blood. The bones become soft and susceptible to fractures.

Milk, cheese, green leafy vegetables like spinach, amaranth and drumstick, methi leaves, curry leaves, gingelly seeds, egg yolk, bones of meat and fish are good sources of calcium.

The daily requirements of calcium is 1 to 1.5 gms for children, 0.7 to 1 gm for adults and 1.5 to 2 gms for pregnant and lactating women.

Calcium deficiency during the period of growth results in defective development of the body skeleton, weakened bones, contracted thorax and pelvic,

defective teeth and stunted growth. Lack of calcium during pregnancy and lactation will not only affect the growth of the baby but also deplete the calcium in the mother's body. On the other hand the greater the intake of calcium by the mother during pregnancy and lactation, the stronger and sturdier the baby will be.

Phosphorus : It is an integral part of every living cell and plays an important role in releasing energy from the food for the use of the body. Without phosphorus, calcium cannot be deposited in the bones. It also helps in maintaining the composition of body fluids.

Spinach and similar green vegetables, wheat, milk and milk products, fish, egg yolk, seeds, fruits, carrot, cauliflower, cucumber etc. are rich sources of phosphorus.

The daily requirement of phosphorus is 1.5 gms for pregnant and lactating women. Phosphorus deficiency seldom develops in human beings.

Iron : It is an essential element of the red corpuscles of the blood. It enables them to carry oxygen. Every cell of the body requires iron as an integral part of its nucleus. Insufficient quantities of iron in the diet will result in nutritional anaemia.

Iron rich animal foods are liver, kidney and egg yolk. Among the vegetable foods, all types of green leafy vegetables, dry fruits, onion stalks, ragi, whole wheat etc. are rich sources of iron.

The daily requirements for iron is 1.5 mg for adults and more in case of women.

Lack of iron leads to lack of haemoglobin and the result is anaemia. If the iron supply is insufficient owing to deficiency in the food, defective absorption or inefficient utilisation, anaemia will result.

Iodine : It is a constituent of the thyroid gland which controls the growth and regulates the speed of various body processes such as metabolism. Deficiency of iodine leads to goitre. Its deficiency disturbs the physical and mental well being of

an individual and causes the disease known as cretinism in children. Subnormal basal metabolism, overweight, lowered mental ability, nervousness and sluggish movements are due to iodine deficiency.

Sources : Sea fish, oysters, and vegetables grown in soils containing iodine. About 0.15 mg of iodine is needed daily.

Copper : Along with iron it is needed for the formation of red blood cells. Copper is required for various functions including the formation of the pigment melanin in the skin. It helps in the synthesis of phospholipid. It is a constituent of enzymes involved in the oxidation of fatty acids. It is necessary for healthy hair.

Millets like cholam, bajara, raw rice, whole grams, cow gram, dried peas, red gram dal, vegetables like drumstick are good sources of copper. Liver is the richest source of copper. Organ meat like kidney is also a good source of copper.

The daily requirement for copper is 1 to 2 mgm for adults and 0.5 mgm for children. A deficiency of copper results in anaemia.

Manganese : It takes part in the release of energy from foods in metabolism. It also takes part in blood formation and in the functioning of certain endocrine glands.

Manganese deficiency in human is not known. Experimental deficiency symptoms are slowing of growth, abnormalities in bone, depressed reproductive functions, neurological weakness of the limbs, ataxia and lack of balance. It is characterised by bone deformities and dislocation of bones.

Cereals, bran, dried beans, peas, green vegetables and nuts are good sources. Tea and coffee are high in Manganese content. Animal foods are relatively poor in it.

Sodium and Chlorine : All the body fluids contain 0.9 per cent sodium chloride which is very important for life. Muscular cramps are caused if there is shortage of common salt.

Sodium is present in many foods in the form of chloride. It maintains normal osmotic pressure and water balance as it is the principal electrolyte in extracellular fluid. It helps to contribute alkalinity of the gastro intestinal tract.

Common salt or sodium chloride is the chief source of sodium in the diet. Animal foods like meat, fish, milk, poultry and vegetables such as spinach, fenugreek, pulses, beet root, carrot, radish and dried fruits are excellent sources of sodium.

About 1 to 2 gms of sodium for adult and 350 mg -1 gm. for children are recommended. For infants 150-400 mg is enough.

Chlorine is present in the body as the chloride ion. It is important for the regulation of osmotic pressure. It helps to maintain the water balance and P_H balance. They activate salivary amylase.

Brief Summary of Minerals in Table Form

Minerals	Rich sources.	Functions in the body.	Recommended daily allowance.
Calcium	Milk, cheese, egg, green vegetables	Bone and teeth formation; coagulation of blood; regulation of heart beat.	Adult man 0.7 to 1.0 gm; Adult woman 0.7 to 1.0 gm pregnancy and Lactation 2gm
Phosphorus	liver, kidney, egg yolk, meat, fish, milk, cheese, cereals	Bone and tooth formation, constituent of cells, regulation of neutrality of the blood.	1.5 gm for pregnant & lactating women.
Minerals	Rich sources.	Functions in the body.	Recommended daily allowance.

Iron	liver, meat, egg, yolk, raisins, peas, fish, milk, whole grains, green vegetables.	Constituent of haemoglobin in the blood and tissue cells, necessary for oxygen carrying power.	Adult man 20 mg Adult woman 20 mg; Pregnancy 40 mg. Lactation 30 mg.
Iodine	seafood, iodised salts and iodised sweets	Necessary for normal functioning of the Thyroid gland.	Adults 0.65 to 0.75 mg
Copper	bajra, raw rice, dried peas, red gram dal, drum sticks, liver	Formation of the pigment melanine in the skin, Synthesis of phospholipids; necessary for healthy hair	Adults 1 to 2 mgm Children 0.5 mgm
Manganese	Cereals, dried beans, green vegetables, nuts, tea, coffee	Release of energy from food in metabolism, blood formation, functioning of certain endocrine glands.	50 mgm adult 50-70 mgm infant 150 mg more for pregnancy & Lactation
Sodium and Chlorine	Meat, fish, milk poultry, spinach fenugreek, pulses, radish, dried fruits.	Maintains normal osmotic pressure, water balance, contribute alkalinity of the gastro intestinal tract.	8 -10 gm

VITAMINS

Vitamins are organic substances present in minute quantities in foods. They are necessary for life, growth and the normal health of the body. Their general function is to act as regulator or catalysis assisting body in utilizing other nutrients.

Vitamins can be classified as fat soluble and water soluble.

Fat soluble vitamins : Fat soluble vitamins are soluble in fats and fat solvents.

They are insoluble in water. So these vitamins are utilized only if there is enough fat in the body.

Vitamin A, vitamin D, vitamin E and vitamin K are fat soluble vitamins.

Water soluble vitamins : Water soluble vitamins are soluble in water and so they cannot be stored in the body. Therefore, a day to day supply of these vitamins are essential. Water soluble vitamins include vitamins B Complex and vitamin C or Ascorbic acid.

Vitamin B Complex:

1. Vitamin B_1 , (thiamine)
2. Vitamin B_2 (riboflavin)
3. Nicotinic acid and Nicotinamide (Niacin)
4. Pyridoxine (B_6)
5. Folic acid
6. Biotin
7. Pantothenic acid
8. Cobaltamin (vitamin B_{12})

Vitamin C or Ascorbic Acid

FAT SOLUBLE VITAMINS

VITAMIN A

Function : It is important for growth. It is necessary for good eye sight. It helps in the healing of wounds. It helps to keep the skin smooth and glossy. Vitamin A is required in the process of vision to adjust to light of varying intensity (dark adaptation). It is required for the formation of the photosensitive pigment, for rhodopsyn or visual purple essential for vision.

Deficiency: Vitamin A deficiency leads to growth failure, day blindness, night blindness, yellow spots in the eye and rough skin.

Sources : Rich sources of Vitamin A are milk and milk products, egg, fish liver oil. The green leaves of cabbage, spinach, lettuce, amaranth and drumstick are rich in beta carotene, which is a precursor of Vitamin A. Carrots, ripe mangoes, papayas and tomatoes are also rich in carotene.

Requirement : The daily requirement of Vitamin A is 3.000 4,000 I.U. for adults and children and much more for pregnant and lactating women.

VITAMIN D

Function : It is essential for the maintenance of normal bone structure and for the proper growth and development of bones.

Deficiency : Bone deformities known as rickets in children and osteomalacia in adults result when the diet is deficient in Vitamin D. Rickets are characterised by irregular dentition, stunted growth, soft bones, knock knees and pigeon chest. Osteomalacia is characterised by softened bones and pelvic deformity in women.

Sources : Rich sources of Vitamin D are milk and milk products, fish, fish liver oil and egg. Ultra violet rays from the sun also helps in the formation of Vitamin D in the body.

Requirement : During the growing period the need for Vitamin D is high and 400 International Units (I.U.) are recommended for infants and children. For women the need for Vitamin D is increased during pregnancy and lactation and 400 I.U. per day are recommended. The requirements for adults may be less but are not known with any degree of certainty.

VITAMIN E

Function : It is necessary for normal reproduction in many animal species. It is an antioxidant that preserves the vitamins which are easily oxidisable. It is successfully used in cases of threatened or repeated abortions in women. Because of its wide distribution in natural foods, the chances of Vitamin E deficiency in most human diets are negligible.
Sources : Rich sources of Vitamin E are wheat germ, wheat germ oil, cotton seed oil, rice germ oil, nuts, leafy vegetables and egg yolk.

Requirement: The exact human requirement of Vitamin E is yet to be discovered.

VITAMIN K

Function : It is needed for the production of prothrombin in the blood. Prothrombin is necessary for the clotting of blood.

Deficiency : Deficiency of Vitamin K may lead to impaired coagulability of the blood.

Sources : The sources of Vitamin K are cauliflower, cabbage, spinach and other leafy vegetables.

Requirement : In the absence of liver disease, there is no need to supplement the diet with Vitamin K.

A brief summary of Fat Soluble Vitamins in Table Form

Name	Use	Sources		Requirement
		Vegetables	Animals	
Vitamin A	Helps growth, prevents eye disease, helps resistance to infection and keeps skin healthy.	Green and yellow fresh vegetables, mangoes, papayas.	Fish liver oil, whole milk, butter, curds, cream, and egg yolk.	3000-4000 I.U.

Name	Use	Sources		Requirement
		Vegetables	Animals	
Vitamin D	Helps growth, builds bone and teeth, prevents rickets. Note - Action of Sun's rays on the skin helps in the production of Vitamin-D	Nil	Fish liver oil, egg yolk, butter.	2000 I.U.
Vitamin E	Helps in reproduction	Wheat germ oil, Liver, lettuce, peas, egg yolk, milk,vegetable oils.		
Vitamin K	Helps in the coagulation of blood.	Green leaves, alfalfa, tomato, cauliflower, cabbage and spinach.	Egg yolk, liver.	

WATER SOLUBLE VITAMINS

Vitamin B Complex

There are a number of vitamins B complex.

One important reason for grouping the vitamins together is that of their functions.

Thiamine (B_1) : It was first isolated from rice polishing in 1926 and synthesised in 1936. It is readily soluble in water and easily broken down by heat in neutral or alkaline solutions.

Function : It is necessary for the oxidation of carbohydrates in the body. This reaction releases energy in the body. It also helps in the normal functioning of the nervous system and the heart. It is essential for normal growth.

Requirement : Daily requirement of thiamin depends on the total calorie intake as it is involved in carbohydrates utilisation. The recommended allowance is 1.0-2.0 mgm. for adults and 0.6 1.0mgm. for children.

Sources : The rich sources of thiamin are whole grain, hand pounded rice, liver, groundnut, egg, fish, pea, bean, milk and green leafy vegetables.

Effect of Deficiency : Thiamine deficiency results in loss of appetite, poorly toned muscles and constipation. Loss of appetite may be accompanied by nausea and vomiting. Its deficiency also affects the nervous system. Some observed symptoms are mental depression, moodiness, irritability, forgetfulness, confusion and fear. Severe deficiency leads to beri beri, a disease of the nervous system. Beri beri is of two types: Dry beri beri and Wet beri beri. In dry beriberi there is loss of appetite, the legs and hands become paralysed, the feet drop and tingling of legs results. In wet beri beri, oedema of the legs and abdomen and enlargment of the heart results.

Riboflavin (Vitamin B_2) : It is found in every living cell. It promotes growth and general health. It prolongs the life span and is essential to nerve tissues and cell respiration.

Deficiency of riboflavin results to sores on the lips, scanliness around the nose and ears, cracks in the corners of the mouth and inflammation of the tongue. Besides, there may be burning sensation in the eyes, digestive disturbances, impaired growth and lack of vigour.

Food rich in riboflavin are liver and other animal organs, eggs, milk and milk products, fish, green beans, peas, green leafy vegetables, whole wheat atta etc.

About 1.5 to 2 mgms. riboflavin is needed daily.

Niacin : It helps the digestive glands and the skin to function normally. It promotes growth and health. Like other B Complex vitamins, it takes part in the metabolism of carbohydrates, fats and proteins. Deficiency of niacin leads to pellagra (rough skin). Pellagra is called the disease of three D's (diarrhoea, dementia and dermatitis), Dementia includes mental depression, confusion and disorientation. Dermatitis includes skin lesions along symmetrical portions of the body such as the palms or cheeks.

Foods rich in niacin are liver and other animal organs, egg, milk and milk products, green leafy vegetables, bean, potatoes etc.

Daily requirement of niacin is 0.6 1.5 mgms. for children and 1 2 mgms. for adults.

Pyridoxine(B_6)

This vitamin widely distributed in nature. The best sources are meat, specially liver, some vegetables and cereals grain .

Deficiency of vitamin B_6 in infants result in epileptic form of convulsions, loss of weight, vomiting and hyper irritability. In adults its deficiency causes depression, confusion and convulsion.

Function : It is found in cells in the active form pyridoxal phosphate. It is involved in carbohydrate, fat and protein metabolism and also for release of glucose from glycogen.

Requirement : Requirement for both men and women is 1.6 to 2.0 mg per day and in case of pregnant and lactating women 2.5 mg per day.

Folic Acid

The name folic acid derives from the Latin word folium meaning foliage or leaf. This vitamin is widely distributed in green leafy plants. Rich sources of folic acid are yeast, kidney, liver and green leafy vegetables.

Folic acid deficiency results in poor growth, anaemia and blood disorders.

Function : Folic acid is essential for the synthesis of nucleic acids and for normal metabolism of certain amino acids.

Requirement : 400 mg daily for children and adults. Pregnant and lactating women require double the amount.

Biotin

It is widely distributed in nature and is essential for good health. Good sources include liver, kidney, egg yolk, groundnuts and some vegetables.

Deficiency of biotin is unlikely in man due to its extensive synthesis in the intestinal tract. Symptoms of its deficiency may include anorexia, nausea, vomiting, mental depression and dry scaly dermatitis.

Requirement: 0.4 mg for adults, 0.8 mg in pregnancy and 0.6 in lactation in the daily diet.

Pantothenic acid

It is widely distributed in nature and is particularly abundant in animal tissues, whole grain cereals and pulses.

Deficiency : As the vitamin is widely distributed in foods, deficiency disease due to lack of it has not observed in man.

Function : As a co enzyme it helps in the release of energy from carbohydrates and in the synthesis of glucose, fatty acids and steroid hormone.

Requirement : An intake of 4-7 mg per day of pantothenic acid for adults and higher intake during pregnancy and lactation.

Vitamin B_{12}

It stimulates the formation of red blood cells, promotes growth in animals and human beings. It is effective in relieving pernicious anaemia. Stiffness of legs,

irritability, drowsiness and depression are some typical neurological symptoms of pernicious anaemia patients.

Animal foods such as liver, kidney, milk, meat and fish are rich sources of vitamin B_{12}.

The daily requirement of vitamin B_{12} is 0.5 to 2 mgms.

Vitamin C (Ascorbic Acid) : It is essential for the formation of teeth and bones, the repair of tissues and the healing of wounds. Vitamin C deficiency leads to scurvy. Symptoms of scurvy are weakness, irritability, bleeding under the skin and in the joints, bleeding gum, delay in the healing of wounds, anaemia and weak bones.

Rich sources of Vitamin C are citrus fruits like lime, lemon, orange and grape fruits, tomatoes, mangoes, papayas and other fruits. Cauliflowers, green leafy vegetables, raw cabbage, green chillies, guavas, sprouted gram etc. are also good sources of vitamin C.

Brief summary of Water Soluble Vitamins in Table Form

Name	Use	Sources		Requirement per day
		Vegetables	Animals	
Vitamin C	Prevents scurvy, prevents bleeding gums and painful joints and in healing of wounds	Citrus fruits, pineapple, cabbage amla, sprouted legumes.		50 mg.
Vitamin B,	Prevents beri beri prevents loss of appetite, keeps the nerves healthy, prevents constipation.	Yeast, whole grain cereals, cabbage, carrots, onions, tomatoes, lady's fingers.	Egg yolk, liver	Adults 1.0 to 2.0 mgms children 0.6 mgm.

Name	Use	Sources		Requirement per day
		Vegetables	Animals	
Vitamin B_2	Prevents visual fatigue, essential for normal digestion prevents angular stomatitis.	Yeast, wheat germ, carrot, cabbage, green leaves	Meat, liver, eggs, whole milk, cheese	Adults 1.0 to 2.0 mgms.
Niacin	Prevents pellagra	Yeast, outer parts of the grain.	Meat, liver kidney, poultry and fish	Adults 1.5 mgm children 1.2 mgm

Daily requirement of vitamin C is 30 mgms. for children and 50 70 mgm. for adults.

Water : Water constitutes nearly three fourths of the body weight. Every tissue and organ in the body contains water. Though the distribution of water in the body is not fixed, the total quantity in the body remains relatively constant. It is necessary for the digestion and absorption of the foods taken in. It is the carrier for all nutrients and body substances. It regulates the body temperature. It is necessary to carry away the waste out of the body. Inadequate intake of water may cause dehydration, fever, shock, constipation and oedema.

Approximately 2.5 litres of water are required by adults daily. Most of this is found in the food we eat.

FUNCTIONS OF FOOD

Body Building : Food rich in protein are called body building foods. They are classified into two groups :

(i) Milk, egg, meat, fish - they are rich in proteins of high biological value, these proteins have all the essential amino acids in correct proportion for the synthesis of body tissues.

(ii) Pulses, oils, seeds and nuts - They are rich in protein but may not contain all the essential amino acids required by the human body.

Protection and regulation : Foods rich in protein, vitamins and minerals have regulatory functions in the body e.g. maintaining the heat, water balance and temperature. Protective foods are broadly classified into two groups :

(i) Foods rich in vitamins and minerals and proteins of high biological values e.g. milk, egg, fish, liver.

(ii) Food rich in certain vitamins and minerals only e.g. green leafy vegetables and some fruits.

Psychological functions : In addition to satisfying physical and social needs food must satisfy certain emotional needs. These include a sense of security, love and attention. Thus familiar foods make us feel secure. Anticipating needs and fulfilling these are expressions of love and attention. These sentiments are the basis of the normal attachment to the mother's cooking.

Physiological Function (Energy giving) : The first function of food is to provide energy. The body needs energy to sustain the involuntary processes, such as beating of the heart, muscle contraction, removal of waste products etc. which are essential for continuance of life. The body also needs energy to carry out professional, household and recreational activities. The energy needed is supplied by the oxidation of the food consumed.

The Social function of Food : Food has always been a central part of our social existence. It has been a part of our community, social, cultural and religious life. Special foods are distributed as *prasad* in the religious functions in the homes, temples and churches. Feasts are given at specific stages of life such as birth, naming ceremony, birthdays, marriages, etc. Most of the religious festivals also call for feasts and feeding specific segments of the population. Certain menus are associated with most of these feasts in each region.

Food has been used as an expression of love, friendship and social acceptance. It is used as a symbol of happiness at certain events in life, for example, *pedhas* are distributed to announce success in examinations, or the birth of a baby, *laddus* are associated with the celebration of Deepavali and marriage, cakes are associated with Christmas and birthdays and *tilgul* with *sankranti*, the festival of friendship.

As food is an integral part of our social existence, this function is important in daily life. Refreshments served at get togethers or meetings create a relaxed atmosphere. The menu for such get together should bring the people together, rather than divide them.

UNIT - VI

METHODS OF COOKING

FUELS FOR COOKING

Cooking may be done either in an open fire or in a closed stove. To be economical an oven or a stove should give maximum heat with minimum fuel and labour.

The following are some of the common types of oven -

1. Fire wood oven

It is the most common oven used in all parts of our country. But proper chimney should be constructed for the escape of smoke.

2. Smokeless Chula

It was the invention of Dr. S.P. Raju of the Engineer Research Laboratories, Hydrabad. It is L shaped and has three holes. Each hole is of 8 inches in diameter. The fire is lighted at one end and the smoke and heat is drawn through the chimney at the other end. If any of the three holes is not in use it should be covered to prevent the smoke escaping into the room (See Fig. 1.1).

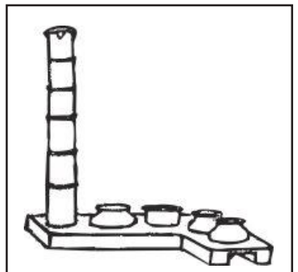


Fig. 1.1 Smokeless Chula

3. Charcoal sigri

It is economical and does not produce any smoke. But there is danger of carbonmonoxide poisoning unless the room is well ventilated.

4. Kerosene Stove

It is economical and portable. It can be easily lit. Its efficiency depends upon how regularly the wicks are trimmed and how clean the stove is kept. It should be kept away from draughts while not in use.

5. Gas stove

Nowadays it is becoming very common in our country. It is easy to maintain and very simple to use. But the gas stove is quite expensive for majority of our people. In using gas stove care should be taken to avoid the exposure of gas to food or to the air around. Because the gas is poisonous and highly inflammable (See Fig. 1.2).

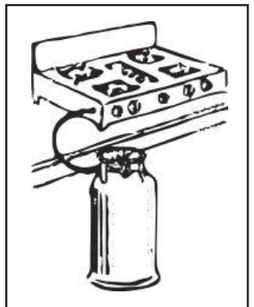


Fig. 1.2 Gas Stove

6. Cow dung Gas or Gober Gas

The gas plant operates on the simple principle that when cowdung or any organic matter ferments in the absence of air a combustible gas is produced. It can be used both for cooking and lighting purposes. The residue can be used as manure.

7. Electric Stove

It is heated by coils through which electric current passes. As it is very expensive it is used in well to do families (See Fig. 1.3).

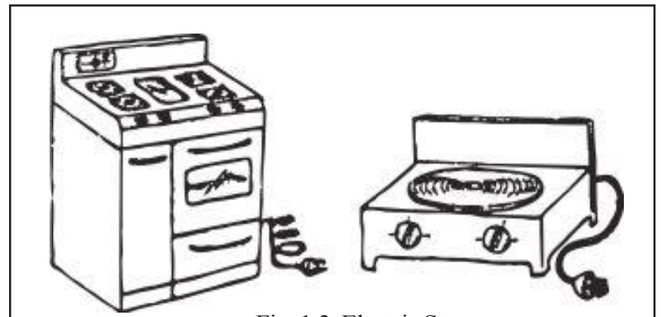


Fig. 1.3. Electric Stove

ADVANTAGES AND DISADVANTAGES OF COOKING

Advantages :

Improves the taste and food quality : Cooking improves natural flavour and texture of food. For example roasting groundnuts, frying onions and papads, cooking rice and roasting coffee seeds improve the flavour. Cooking meat with spices, rice with spices in making pulao, frying cashewnuts in ghee, addition of turmeric, curry leaves, pepper etc., blend flavour with one another during cooking.

Too much of cooking lowers the flavour as flavouring compounds are volatile. Over cooked pulao, does not taste as good as well cooked pulao.

Destruction of microorganism : Microorganisms are present everywhere and some are useful in making curd, cheese and bread. Some are harmful and cause infections or produce toxins.

One of the most important methods of protection of food against harmful microorganism is by the application of heat. Cooking food to the required temperature for a required length of time can destroy all harmful microorganisms in food.

Improves digestibility : Cooking softens the connective tissue of meat and the coarse fibres of cereals, pulses and vegetables so that the digestive period is shortened and gastro intestinal tract is less subjected to irritation. Cooking improves the texture hence it becomes more chewable. Cooking also bursts the starch granules of pulses and cereals so that the starch digestion is more easier, rapid and complete. When dry heat is applied to starches they are converted to easily digestible dextrins. Cooking increases the access to enzyme and improves digestibility.

Increase variety : By cooking same food can be made into different dishes. For example, rice can be made into plain, pulao, lemon rice, biryani, etc. Wheat can be made into chapatti, puri, paratha or halwa.

Increase consumption of food : Cooking improves the texture and makes the food chewable. Improvement in texture and flavour by cooking increases the consumption of food to meet our nutritional requirement.

Increase availability of food : Raw egg contains avidin which binds biotin making biotin unavailable to the body. By cooking, avidin gets denatured and biotin is available to the body.

Trypsin inhibitors present in soyabean and duck egg get denatured on cooking and availability of protein is improved. Toxic substances from kesari dhal can also be removed by boiling it and throwing away the water. Cooking increases the quality of protein by making some aminoacids available to the body.

Concentrate nutrients: This may be due to removal of moisture or using combination of foods or due to cooking procedures, e.g. sweets.

Disadvantages

Thiamine, which is heat sensitive, may be lost during cooking. Water soluble nutrients get dissolved into the water during cooking. Vitamin A and C content may be reduced due to oxidation and heat.

Quality of protein may be reduced due to destruction of certain aminoacids during cooking e.g. bread crust has less quality of protein compared to the inside portion.

SOME COMMON METHODS OF COOKING

Boiling: It is cooking foods by putting them in water and boiling till the food is tender. Water is said to be boiling when large bubbles are seen rising constantly on the surface of the liquid and then breaking rapidly. Water receives heat by conduction through the sides of the utensil in which the food is cooked and passes on the heat by convection currents which equalise the temperature and become vigorous when boiling commences. Boiling point of water is 100^0C.

When foods are cooked by boiling, the food should be brought to a vigorous boil first and the heat is then turned down as violent boiling throughout tends to break the food. Further the temperature of the water cannot be increased any further after it begins to boil and continued vigorous boiling only results in excessive evaporation of water and waste of fuel. And foods are likely to get burnt at the bottom and form a dry crust at the top.

Foods may be boiled in any liquid which is bubbling at the surface such as stock (broth), milk, juices or syrups. Foods that are cooked by boiling are rice, eggs, dals, potatoes, meat, sago and beet root. Boiling can be done with excess amount of water (eggs, potatoes) or with sufficient water (dal, upma).

Boiling is generally used in combination with simmering or other methods, e.g. cooking rice, vegetables or dal.

Par boiling: It is a process widely used in the preparation of rice for human consumption. By par boiling we mean steaming of unhusked rice after soaking. Striking changes are brought about in the nutritive value of rice as a result of par boiling. Some of the nutrients from the pericarp, and germ or embryonic plant diffuse into the inner endosperm. Therefore when par boiled rice is milled, even though it loses the germ and the pericarp it will not lose all nutrients. Par boiled rice retains a considerable proportion of Vitamin B_1 even when highly milled.

Steaming: This method requires the food to be cooked in steam. Steam is generated from vigorously boiling water or liquid in a pan so that the food is completely surrounded by steam and not in contact with the water or liquid around. Here the food gets cooked at 100°C. Steaming is generally done in special equipment designed for the purpose e.g. Idli cooker and Rukmani cooker. There are three types of steamings.

Wet Steaming : Here the steam is in direct contact with the food e.g. idli.

Dry Steaming : Here double boiler is used for cooking the food. Double boiling is cooking in a container over hot or boiling water. This process is used for such preparations as sauces and custards where temperatures below boiling point are desirable. The food is placed in an utensil which is kept in another utensil containing water. When the water is heated or boiled the food gets cooked.

Waterless Cooking : In waterless cooking the steam originates from the food itself. Cooking food wrapped in an aluminium foil is one form of waterless cooking. In this case there is an advantage of preventing the transmission of the flavour from or to the sealed food.

Pressure Cooking: A relatively small increase in temperature can greatly reduce cooking time and this fact is utilized in pressure cookers. In pressure cooking, escaping steam is trapped and kept under pressure so that the temperature of the boiling water and steam can be raised above 100^0C and reduce cooking time.

Boiling for 1 hour at 100^0C can be reduced to half an hour at 110^0C and further can be reduced to 1/4 hour at 120^0C. In practice the reduction in cooking time is limited by the pressure temperature relationship of steam. Above 130-140^{0}C the pressure generated increases enormously for very small increase in temperature. Above 130^0C massively constructed pressure vessels are required. Hence 120^0C is an effective limit.

The domestic pressure cooker is usually constructed of heavy gauge, aluminium and the pressure is regulated by weight placed upon a release valve. A safety valve is always fitted to prevent pressure excess beyond the safe and specified level for the vessel. A common practice in pressure cooking is to allow a free flow of steam from the release valve before capping it with the weight. This ensures that all air is removed before the cooking process starts. Even the presence of a small

quantity of air with the steam diminishes the heat transfer properties of the steam drastically. Purging of the enclosed air is therefore a vital step in using a pressure cooker.

Pan broiling or roasting : When food is cooked uncovered on heated metal or a frying pan the method is known as pan broiling, e.g. groundnuts and chapatis.

Advantages

* Improves the colour, flavour and texture of the food.
* Reduces the moisture content of the food and improves the keeping quality, e.g. rava.
* It is easy to powder e.g., cumin seeds and coriander seeds, after roasting.
* It is one of the quick methods of cooking foods.

Stewing: This is a slow method of cooking in a pan with a tight fitting lid, using small quantities of liquid to cover only half the food. The food above the liquid is cooked by the steam generated within the pan. The liquid is brought to boiling point and then the heat applied is reduced to maintain the cooking at simmering temperature i.e., 98^0C. Stewing is a slow method of cooking taking from 2 to 4 hours depending upon the nature and volume of the foods being stewed. This method is generally used for cooking cheaper cuts of meats along with some root vegetables and legumes all put in the same cooking pot and cooked in stock or water. The longer cooking time and lower temperature enable tougher meat fibres to become soft. The cooking of meat and vegetables together make the dish attractive and nutritious since no liquid is discarded. Apples can also be cooked by this method.

Frying

Sauteing: This method involves cooking in just enough of oil to cover the base of the pan (greasing the pan) e.g. dosa. The food is tossed occasionally or turned over

with a spatula to enable all the piece to come in contact with the oil and get cooked evenly. Sometimes the pan is covered with lid, reducing the flame and allowing the food to be cooked till tender in its own steam. The product obtained in cooking by this method is slightly moist, tender but without any liquid or gravy. Foods cooked by sauteing are generally vegetables used as side dishes in a menu. The heat is transferred to the food mainly by conduction. Fish can be cooked by this method.

Shallow fat frying: Here the food is cooked in larger amount of fat but not enough to cover it. Heat is transferred to the food partially by conduction by contact with the heated pan and partially by the convection currents of the fats. This prevents local burning of the food by keeping away the intense heat of the frying pan e.g. paratha, chapati, cashewnuts, potatoes, fish, cutlets and tikkis.

Deep fat frying : Food is totally immersed in hot oil and cooked by vigorous convention currents and cooking is uniform on all sides of the foods. Cooking can be rapidly completed in deep fat frying because the temperature used is 180-220^{o}C. In most foods, this high temperature results in rapid drying out of the surface and the production of a hard crisp surface, brown in colour. The absorption of fat by the food increases the calorific value of the food. Fats when heated to smoking point decompose to fatty acids and glycerol followed by the decomposition of glycerol to acrolein, which causes irritation to the eyes and nose. Generally some 10% of oil is absorbed but larger amount of fat is absorbed when oils are used repeatedly. Samosa, papads, chips, kachouri, pakoda and bonda are made by deep fat frying.

Grilling or Broiling : Grilling consists of placing the food below or above or in between a red hot surface. When under the heater, the food is heated by radiation only. This results in the browning of food. Then the heat is more slowly conducted through the surface of the food downward. As heating is most superficial, foods are usually reversed or rotated in grilling. If the food is above the heater, heat is transmitted to the food through convection currents as well as radiation with consequent increased efficiency. Foods cooked by grilling are cob on the corn, papad, brinjal, phulkas, sweet potato etc.

The term toasting is used to describe a process by which bread slices are kept under the grill or between the two heated elements to brown from both sides of the bread at the same time. This can be adjusted to give the required degree of brownness through temperature control.

Baking: Here food gets cooked by hot air. Basically it is a dry heat method of cooking but the action of dry heat is combined with that of steam which is generated while the food is being cooked. Foods baked are generally brown and crisp on the top, soft and porous in the centre, e.g. cakes, pudding and breads. The principle involved in baking is the air inside the oven is heated by a source of heat either electricity or gas or wood in case of tandoori. The oven is insulated to prevent the outside temperature from causing fluctuations in internal temperature of the equipment. The methods of heat transfer involved are radiation from the source of heat to the metal wall at the base of the oven, by conduction from the base to the other walls and by convection through the heated air currents set up in the oven to the food. The temperature that are normally maintained in the oven are 120°C - 260°C. Food prepared by baking are custards, pies, biscuits, pizzas, buns, bread, cakes, tandoori chicken, tandoori meat and fish.

EFFECT OF COOKING ON THE NUTRITIVE VALUE OF FOODS

Proteins: Application of heat to proteins causes coagulation and shrinkage. Moderately cooked protein is more easily digested than raw protein. But excessive exposure to heat as in roasting will eventually reduce appreciably the nutritive value of proteins. Certain foods like pulses show marked improvement in nutritive value as a result of heat treatment. They contain substances which hinder digestion of proteins by the enzyme trypsin. These substances or trypsin inhibitors are destroyed by heat during cooking, thus bringing about an improvement in the nutritive value of proteins.

Carbohydrates: Cooking is essential for proper digestion of starch which is an important source of calories in the diet. When heat is applied in any method of cooking, the starch granules swell up and burst. They become gelatinized in which state they are almost completely digested and absorbed. Raw starch such as wheat flour, potato etc. enclosed in starch granules are resistant to human digestive juices.

Fats : Cooking under ordinary household conditions has very little effect on fat but there is some evidence to show that prolonged heat (e.g. when same fat is used for frying over a number of days) fats become slightly toxic.

Vitamin A : It is not soluble in water, so no loss occurs by discarding the cooking water. There is only slight destruction of Vitamin A and carotene when foodstuffs are cooked in water, but on frying or roasting considerable loss occurs.

Vitamin D : There is not much loss during boiling or steaming, but considerable loss of this vitamin occurs during frying (especially deep fat frying), and roasting.

Vitamin B_1 : The loss vitamin B_1 in foods occurs in two ways: (i) Its destruction during cooking, (ii) Its dissolution in the cooking water.

Hence the amount lost during cooking varies. Discarding the cooking water accounts for nearly 20% - 50% loss, depending on the amount of water used for cooking. If soda is added to dals while cooking, vitamin B_1 is completely lost. Cooking at very high temperature accounts for a considerable loss of this vitamin.

Vitamin B_2 : There is much loss of this vitamin when food is boiled. Adding of soda for quicker cooking of pulses accounts for 80% - 90% loss of this vitamin during cooking.

Vitamin C: The loss of vitamin C during cooking of vegetables is mainly due to oxidation and this is accelerated by exposure to air. High acid content prevents loss to a certain extent. Discarding the cooking water accounts for a considerable amount

of loss of vitamin C. Contact with copper vessel also accelerates the loss of vitamin C. The quantity of vitamin C loss from vegetables during cooking vary from 10 to 60 per cent of the quantity present in the food, depending on the vegetables cooked and the method of cooking.

Calcium and Phosphorus: Cooking does not affect the calcium and phosphorus contents except when the cooking water is discarded. When vegetables are cooked in hard water appreciable amounts of calcium present in the water become incorporated in them.

Iron : There is particularly no loss during cooking of foods except when the cooking water is discarded. In general cooking tends to increase the ease with which the body can absorb iron from foods. Further, dietary iron may be increased due to amounts picked up from iron knives used for slicing vegetables and from cast iron pans commonly used for cooking them.

UNIT - VII

SOME COMMON FOODSTUFFS AND THEIR USES

Cereals : Cereals are seeds of the grass family. The most commonly used cereals are : rice, wheat, maize(corn), and millets such as jowar, bajra and ragi. Cereals are inexpensive rich sources of carbohydrates. They contain approximately 65-75 per cent carbohydrates.

Wheat : Wheat is widely cultivated in the world. In India, Punjab is the leading state which grows wheat. There are two crops in a year the summer and winter crops. Wheats are commonly milled into flour or grinded to obtain whole wheat flour. Refined flour or Maida is commonly used in bread and other baked products while whole wheat flour or atta is used in the preparation of chapaties, puries, parathas etc. Products of wheat, commonly used are: broken wheat, semolina (suji), and extrusion products like vermicelli, noodles and macaroni.

Rice : Rice is the major food of many people living in Asia, and is the most widely used of all cereals next to wheat. Rice is available as milled, unpolished, polished, parboiled, flaked and puffed rice. Milling removes the bran, aleurone layer and some of the germ. Polishing further removes more than half the mineral matter and most of the vitamins. By a especial process, grains of rice may be parboiled before milling. Parboiled rice contains more vitamins and minerals, because the steeping

in hot water causes migration of these nutrients from the outer coats to the interior of the kernel and are not lost during milling. Parboiling also gelatinize the starch and changes the cooking characteristics of the rice. Rice flakes are made after soaking the rice paddy in hot water and then pounding it. It is an important source of iron and thiamine in the Indian dietary and contains more minerals and fibre than the milled rice.

Millets : Millet is a common name applied to edible seeds of members of the grass family. These include bajra, jowar, maize and ragi, which are the common millets consumed in India. Millets are hardly crops and require less care than do cereals. They grow under conditions of poor rainfall and soil.

The average calorie content of millets is 350Kcal per cent and is comparable to that of cereals. On an average, these contain 10–11 percent of protein. Millet proteins lack in the essential amino acid lysine. The protein quality of millets, may be improved if they are eaten along with dals or milk products. Millets are a good source of iron. Ragi is known for its high calcium content which is 344 mg per cent. Ragi is cheaper source of calcium than milk or nuts and oilseed. Millets also contribute B complex vitamins thiamine, riboflavin and niacin to our diets. They are high in fibre content.

Pulses : In fact pulses are edible seeds of leguminous plants. Therefore pulses and legumes mean the same thing. The word dal is to indicate decorticated, split products obtained from pulses.

Dals and pulses, are a rich source of iron, The iron content varies from 5 to 12 mg. Groundnuts have a low iron content of only 2 mg percent. Dals and pulses have between 55 to 200 mg of calcium percent.

Dals and pulses are rich sources, of vitamin B-complex group. Thiamine content is fairly high, being 0.5 to 1.0 mg percent while riboflavin is low and varies from 0.1 to 0.3 mg percent, niacin content is approximately 2.0 mg percent, when pulses are germinated there is an increase in the concentration of B group of vitamins. In addition, vitamin C is also produced in the process of germination of pulses.

Some toxic substances are naturally present in some pulses. These include trypsin inhibitors and haemaglutinins. Trypsin inhibitor, as the name indicates, interferes with digestion of proteins by inhibiting the action of the enzyme trypsin.

Milk and Milk products : Milk has a very special place in the Indian diet. It is an essential part of our morning's first cup of tea or coffee. Curd or butter milk is made from milk. Milk is also used to make popular sweets such as pedhas, barfi and a variety of halwas. A number of desserts from milk are made for special feast and guest meals. These include kheer, Shreekhand, rasgullas, gulab jamuns, etc.

Composition of Milk : The major components of milk are water, protein, fat, the sugar lactose and minerals. The main proteins in milk are casein and lactalbumin. Casein which accounts for 0.87 percent of the total proteins present is a phospho protein. Milk fat contains some volatile fatty acids. These are released when butter turns rancid. Lactose is the sugar present in milk. It is present in the milk serum. Milk is an excellent source of the minerals calcium and phosphorous.

Nutritive Value : The composition of milk from various species of mammals differs markedly. It may be noted that human milk has the highest lactose content and lower protein, fat content of buffalo milk is reflected in the higher calorific value.

Milk contains proteins of high biological value, which can support life through its first critical six months. Milk proteins contain certain essential amino acids, which supplements those of proteins from cereals. Milk fat is in an emulsified form and hence is readily utilised in the body. Lactose, the only sugar in milk contains galactose, which is essential for brain development. Milk is an excellent source of calcium and phosphorous. Thus in the presence of vitamin D these minerals can be readily used for bone development. Milk contains very little iron. All vitamins, known to be essential for human nutrition, are present in milk. Milk is an excellent

source of riboflavin, a vitamin of the B complex group. It is low in niacin, but a good source of tryptophan, an amino acid, which acts as a precursor of niacin. Milk contains only about 2 mg ascorbic acid per 100 g. As milk is used only after boiling in India, part of the vitamin C is destroyed. Therefore milk fed babies need supplements of foods containing ascorbic acid.

Milk is a rich source of vitamin A, as it contains both the vitamin and its precursor, beta carotene.

Dehydrated Milk Products: Include whole milk powder, skimmed milk powder, infant milk foods and malted milk. Indian standards require that the moisture content of the dried milk be less than 4 percent. Therefore dehydrated milk is a concentrated source of protein, calcium and riboflavin and other nutrients.

Curds (Yoghurt) : Curds a fermented product of milk and is a very popular milk product in India. It ranks second to milk in extent of consumption. The optimum temperature for the formation of curd is 35- 40^{o}C. The time needed for curd formation varies from 8 -12 hours depending on temperature. It is reported that the riboflavin and thiamine content increases, during curd formation. Fermented milk inhibits the growth of Bacillus typhosus, Bacillus dysenteriae, and Vibrio cholerae to a certain extent.

Paneer : It is prepared by addition of lemon juice or citric acid to hot milk and precipitating out the casein. The liquid residue in this process is known as whey and contains most of the soluble nutrients from milk. Paneer contains about 18 percent protein.

Cheese : The milk is subjected to several process steps to produce cheese. Cheese contains about 24 percent protein and is thus a concentrated source of protein.

Buttermilk : Buttermilk is made by adding water to curd and churning to remove fat in the form of butter. The energy value is thus reduced due to removal

of fat. The concentration of the other nutrients is reduced in proportion to the dilution.

FISH, MEAT, POULTRY AND EGGS

Fish: Fish and shellfish are two large groups of sea foods in coastal regions. These are very good source of animal proteins, minerals and vitamins. Salt water fish and fresh water fish have distinct individual flavours.

Fishes are of many varieties. Fresh fish do not have foul odour, and has a firm elastic flesh and bright, clear eyes. Fish contains polyunsaturated fatty acids. Sea fishes provide us with iodine.

Nutritive Value : Fish are an excellent source of protein. Most fish has a low fat content.

Poultry : Various types of birds like the chicken, turkey, goose, duck etc. are included in this group. Poultry is one of the sources of animal proteins in our diet. Poultry is sold in various forms- whole live birds, or dressed.

Nutritive Value : Poultry is considered to be a delicacy. Its nutritive value is comparable to that of meat. The fat content, is lower than that of meat. Poultry provides less calories than meat. The total calories in the prepared product may increase if high calorie foods like fat, butter, oil, are liberally used in preparation.

Meat: Meat is one of the animal protein foods used. Meat protein has high nutritive value. Meat is a good source of protein and fat. The proportion of nutrients in meat depend upon the kind of animal, the species and the type of cut. The protein content of meat decreases with an increase in fat content. The average protein content of meat ranges from 16 to 23 percent and the average fat content ranges from 10 to 40 percent. Meat is a good source of phosphorous, iron and some trace elements. Unless the cooking water is discarded, minerals and water soluble vitamins are not lost to a great extent. Meat provides us vitamin B complex and some vitamin A, depending on the cut.

Eggs : Eggs are good and important source of protein in the human diet. The egg is composed of the shell, the white, and the yellow or yolk. The egg shell is covered with a protective coating, which helps in maintaining the freshness of the egg.

The egg white contains a large percentage (88 percent) of water, protein (10 percent) and some mineral matter (1 percent). In contrast, the percentage of water is much reduced (49.0 percent) in the yolk and it contains a large percentage of fat (32.0 percent) and protein (16.7 percent), and some mineral matter (2.0 percent).

Nutritive Value : Eggs are a good source of protein of high value. One egg contains about 5 to 6 grams of protein, 1 mg. of iron, about 1000 I.U. of vitamin A and appreciable amounts of thiamine, riboflavin, and certain other vitamins of the B complex group.

ROOTS AND TUBERS

The roots and tubers are characterized by lower water content than leaves and other vegetables (about 70 percent). Most of the utilizable carbohydrate is in the form of starch, with a small amount of it in the form of sugar. Examples of some commonly used roots and tubers are - potatoes, sweet potatoes, onions, tapioca, colocasia, yams, raddish, carrot etc.

The roots and tubers provide 1.2 to 3 percent protein. The only exceptions are radish and tapioca, which supply only 0.7 percent. These vegetables supply a small amount of minerals and vitamins. The only exception is carrot, which is a fair source of beta carotene, the precursor of vitamin A.

VEGETABLES

Leafy Vegetables : In the tropics different varieties of leafy vegetables are available. The leafy vegetables commonly called greens or sags have distinct flavours. Some

are acidic, some sticky and others bitter. Special techniques are used in preparation and other ingredients are added to bring a desirable blend of flavours.

The green colour of leafy vegetables is due to chlorophyll. It is a green coloured fat soluble plant pigment. Chlorophyll turns olive green, in acidic medium. It is sensitive to heat and changes to olive green on prolonged heating.

The leaves contain two pigments chlorophyll (green) and carotene (yellow). The carotene is masked by the chlorophyll, and we can see only the green colour of chlorophyll, when both are present.

The intensity of the green colour is an indirect indicator of the vitamin A value of the leaves. The dark green leafy vegetables are a rich source of beta carotene, which is a precursor of vitamin A. The light coloured bleached inner leaves of plants that form compact heads e.g. cabbage, contain little vitamin A value.

Other vegetables : The fruits, flowers, beans, stems and shoots are included in this group. Fruits include not only cucumber, brinjal, tomatoes, ladies finger, but also all gourds-ash gourd, bitter gourd, snake gourd, ridge gourd, pumpkin etc. Flowers include cauliflower, plantain flower and many others. All beans and peas belong to this group.

These vegetables supply variable amount of mineral and vitamins. The immature beans and peas contain more protein (3.6%) than the rest of the group. The fat content of all these vegetables is negligible and therefore the calorie content per 100 grams varies from 40 to 80 depending on the carbohydrate content. These vegetables, supply fibre, which is necessary to add bulk to the diet and maintain muscle tone in the digestive tract and help in the elimination of food waste as faeces.

Fruit : Fruits are the mature ovaries of plants, which contain the seeds. Fruits are produced from a flower or flowers. Fruits are pulpy, often juicy with an exquisite

blend of sweet and sour taste, fragrant aroma and flavour. Ripe fruit is nature's gift with pleasant aroma, colour and flavour.

Composition : Fresh fruits have a high water content (70-96%), varying amount of carbohydrate (3.27%) and fibre (0.2 to 3.1%), and a low content of protein, fat and minerals. Most fruits contain an edible part combined with some inedible portion.

There are some fruits which are wholly edible such as berries, guava, grapes and tomato. While apples, pears, peaches, cherries and sapota have 85-90% edible portion, other fruits such as bananas, sweet lime, orange and pineapples contain a third or more inedible portion.

The carbohydrate in the fruit is made up of fructose, glucose, sucrose and starch as well as some fibre. The carbohydrate content of fruits varies from 3 in watermelon to 27 percent in banana. Most of the energy of fruits (80 to 96%) is provided by the sugars present. Therefore fruits or fruit juices are given when a quick source of energy is needed, e.g. as appetizers and as refreshing drink for athletes.

Fruits are generally acidic and sweet. There are a number of other flavour components, which give distinctive taste and flavour to each variety of fruits.

Fruits are important sources of provitamin A and vitamin C. Some dry fruits are rich source of minerals calcium and iron.

In India, there are fruits , such as amla, guava, cashew fruit, which are extremely good sources of vitamin C, providing 135 to 600 mg of vitamin C per 100gm edible portion. The choice of fruits, as sources of vitamin C, is large in tropical countries. The quantity of fruit eaten may have to be increased, if a source containing medium or low amount of vitamin C is used. Fruits such as papaya, orange and mango, contain orange- yellow pigment carotene, provide precursor of vitamin A.

NUTS AND OIL SEEDS

Nuts and oil seeds are important sources of plant proteins in our diets. Some of the commonly used nut and oil seeds in India are groundnuts, coconuts (dry and fresh), cashewnuts, almonds, walnuts, gingelly seeds, mustard seeds etc. They impart a delicate flavour to the product. Crushed oil seed may also thicken the product. Oil seed and nuts (groundnut and coconut) are mainly used for the extraction of oil.

Nuts are dry fruits of an edible kernel enclosed in a woody shell. The most well known nuts are almonds, cashew nuts, coconuts, walnuts and groundnuts.

Nuts are rich in protein but their protein is of low biological value and is not absorbed properly. Their calcium and iron are not all available to the body. They are rich in fats and hence have a high caloric value, but vegetable fats lack Vitamin A and D.

Groundnuts : These are also known as peanuts. They are grown underground and this may account for the name groundnuts. There are two varieties white and red. Ground nuts contains 26% protein, 41% fat, 0.9 mg. % thiamine. Groundnuts are exceptionally good source of niacin. The niacin content varies from 15 to 25 mg.% with variety.

Coconut : Mature coconuts are used for various preparations.

Dry Coconut : The keeping quality of dry coconut is greater than that of the fresh coconuts, as a nut and as a part of the prepared product.

Gingelly Seeds : Two varieties are available black and white. Gingelly seeds are used in curries and gravies as thickening agents. Gingelly seeds provide 1-8% proteins, 43% fat. It is a very rich source of calcium. Gingelly seeds are a fair source of iron, thiamine and niacin.

SUGAR AND JAGGERY

Sugar occurs in solution in nature. When the solution is concentrated, the sugar crystallizes. This principle is used in the manufacture of sugar.

Sugars supply energy to our body. Each gram of sugar supplies four calories. Sugar can be metabolised quickly to meet energy needs of our body. It is mainly used as a sweetening agent in beverage such as tea, coffee, fruit drinks, porridge, in puddings, pies, cakes, biscuits and frozen deserts such as ice cream.

When used in higher concentration, sugar acts as a preservative as well as a sweetening agent, e.g. jams, jellies, marmalades, squashes, sweetened condensed milk, ladus, etc. In confectionaries sugar is the major ingredient responsible for its shape and taste.

Jaggery : It is prepared by concentrating cane juice. It is not refined and has a light to dark brown colour, due to impurities present. It contains about 96 percent sugar, about 2 percent moisture and traces of minerals and proteins. The presence of other substances imparts a characteristic rich flavour to Jaggery. The presence of salts is noted by the slightly saltish taste.

SPICES AND CONDIMENTS

Spices and condiments form an indispensable part of our cultural food pattern. The term 'spices' applies to natural plant or vegetable products or mixtures of these, in whole or ground form. These are used as seasoning, for imparting flavour and aroma to foods.

Spices may comprise of plant components such as:

The Floral parts	-	cloves, saffron (Kesar).
The Fruits	-	chillies, tamarind, cardamom (Elaici).

The Berries	-	black pepper (Kali mirch).
The Seeds	-	Mustard, cumin, coriander, fenugreek, ajowan.
The Rhizomes	-	turmeric, ginger.
The Roots and bulb	-	garlic, onion.
The Leaves	-	mint, 'tejpat', curry leaves, coriander leaves.
The Kernel	-	nutmeg.
The Aril	-	mace.
The Bark	-	cinnamon, cassia.
Exudate of bark	-	asafoetida (Hing).

They provide taste and flavour to our diet, their aroma and taste are due mainly to the essential oils they contain. They also contain protein and carbohydrate. They do not contain fats in appreciable amounts. They contain minerals and some of them contain carotene and riboflavin also. Since small amounts of spices are used in food preparation, the nutrient contributed by them is negligible.

QUESTIONS

1. Name the purposes for which wheat flour and maida are used ?
2. Which one is more beneficial to the body milled rice or parboiled rice ? Give reason.
3. Why do we germinate chana dal ?

4. Indicate the nutritive value of pulses.
5. Write the composition of cow's milk.
6. Name the processed products of milk.
7. Which nutrients are common to fish, meat and poultry ?
8. Name some local fishes which are fondly consumed by the Manipuri people.
9. Name five locally grown roots and tubers.
10. What indicates the richness of vitamin A among leafy vegetables ?
11. In which forms are carbohydrates found in fruits ?
12. For what purpose/purposes the following nuts and seeds are used:
    Groundnuts, coconut, mustard seeds ?
13. How do we get jaggery ? Why does it taste salty ?
14. What roles do spices play in food preparation ?
15. Define the following terms:
    (a) Food
    (b) Nutrition
    (c) Nutritional status
16. Classify proteins on the basis of food sources.
17. Name five locally available protein rich foods.
18. What are the symptoms of kwashiorkor ?
19. Collect protein rich foods from the local market. Study and classify them into animal and vegetable proteins.
20. Draw the outline diagram of the following:
    (a) Egg

    (b) Fish
    (c) Groundnut
    (d) Whole chana dal
21. Name the food rich in carbohydrates.
22. What percentage of calories should be supplied by carbohydrates ?
23. Collect, examine and draw some locally available carbohydrate rich foods.
24. Name the vitamins which cannot be absorbed without fat.
25. Name the fats and oils which are commonly used in our state.
26. What happens when there is insufficient intake of calcium in the diet ?
27. What food sources you suggest for proper supply of iron in your family meal ?
28. What happens when the food intake is lack in iodine ?
29. For what purposes/functions the following vitamins are needed:
    Vitamin A, Vitamin D, Vitamin E, Vitamin K ?
30. State the deficiency diseases caused by lack of the following vitamins in the diet - Thiamine, Riboflavin, Niacin and Ascorbic acid.
31. What important functions are served by water in the body ?
32. Write in brief the different functions of food.
33. List down the advantages of cooking food.
34. What are the disadvantages of cooking ?
35. Write short notes on :
    Simmering, Stewing, Steaming, Pressure cooking.
36. Select the best method of cooking for each of the following
    Rice, Wheat flour, Chana dal, Egg, Apple.

37. State the effect of cooking on the nutritive value of the following vitamins and minerals :

    Vitamin A, Vitamin B, Vitamin C, Iron.

38. Name some prepared foods which are cooked by deep fat frying.

39. What temperatures are required for the following methods of cooking :

    Baking, Boiling, Stewing.

40. List down the cooking utensils which are used in your kitchen.

41. Draw the diagram of the following common cooking utensils :

    Pressure cooker, Frying pan.

UNIT - VIII

GROWTH AND DEVELOPMENT

Meaning of Growth and Development

The terms growth and development have different meaning but are often used synonymously. Growth generally refers to the physical aspects. It is quantitative indicating changes in size, shape and proportions of the parts of the body.

Development, on the other hand, refers to those changes which are quanlitative in nature. It may be defined as a progressive series of changes that has occurred as a result of maturation and learning. As the child's body becomes larger physically, there is also an increase in the size and structure of the internal organs and of the brain. As a result of the growth of the brain, the child has a greater capacity for learning, for remembering and for thinking. The child grows and develops physically as well as mentally.

Stages of growth and development

All cultures divide the life span into periods. Each individual goes through a succession of developmental stages. The total life span is usually sub divided into ten (10) stages or periods each of which is characterised by certain development characteristics.

One of the accepted sub-stages of development which is outlined by one of the psychologists are given below:

1. Pre natal period : Pre natal period begins at the time of conception and extends till birth. Before birth, development is extremely rapid. It is mainly physiological and consists of the growth of all the bodily structures.

2. Infancy : From birth to 10 -14 days. This is the period of new born baby. During this time the baby is trying to adjust to a totally new environment outside the mother's womb, which requires the performance of bodily functions like breathing, sucking, swallowing, excretion of waste and the like.

3. Babyhood : From 2 weeks to 2 years of age. At first babies are completely helpless. With the passing of day, week and month, the individual becomes more independent and self reliant, and is able to move about on his own.

4. Early childhood : From 2 years to 6 years of age. Early childhood is also known as pre school age, when children go to pre school to learn the rudimentary knowledge of reading, writing and arithmetics. During this time, children learn to make social adjustment to his family members and to those outside the family circle with whom he comes in contact.

5. Late childhood : 6 to 12 years of age, the stage of Elementary school age, when children go to proper schools to gain the knowledge that are considered essential for successful adjustment to later life. It is also a time when children form the habit of being achievers, underachievers or overachievers. During this time children prepare physically and psychologically for adolescence and become sexually mature.

6. Puberty : 12-13 years of age. This is the period when the child's body is transformed into an adult body. It is also marked by maturation of sexual organs.

7. Adolescence : 13-18 years of age. This is the period when the child is growing to maturity. It is also the beginning of adulthood where immense - necessity of adjusting to the demands of society has to be faced.

8. Early adulthood : Eighteen to forty years of age. This is the period when the individuals have completed their growth and reach the age of maturity for marriage and is capable of procreation.

9. Middle age : Middle age is generally considered to extend from 40-60 years of age. The outset is marked by the physical and mental changes. There is usually a decline in physical vigor, accompanied by a decline in mental alertness.

10. Old age : From sixty years to the end of the life. It is the closing period in the life span. It is a period when people move away from a more desirable period to an uncertain future.

Old age is frequently sub divided into early old age which extends from age sixty to age seventy and are usually referred to as ‘elderly’, meaning somewhat 'old'. After seventy, the individual is advanced far in years of life having lost the vigour of life.

PHYSICAL DEVELOPMENT DURING BABYHOOD

Babyhood is one of the periods of rapid growth. During the first six months of life growth continues at a very rapid rate and then begins to slow down. During the first year of life, there is a greater increase in weight, which is followed by an increase in height during the second year of life to proportion the body structure.

While the general pattern of growth and development is similar for all babies, there are variation in height, weight and other areas of physical development. This may be due to a poor physical condition resulting from maternal malnutrition, stress and strain and some other unfavourable condition during pregnancy.

There are also variations in body size of babies of different socioeconomic levels. Babies whose parents are of lower socio economic levels tend to be smaller in both height and weight than those whose parents come from the higher socio economic levels.

However, in spite of all these variations, there is a general pattern of growth and development followed by all children, regardless of caste and creed.

The general pattern of growth and development, outlined by Horlicks are given below :

Weight : After the loss of weight immediately after birth when the baby is trying to adjust to the new environment, the baby's weight begins to increase. By the time the baby is four months old, he normally doubles his birth weight. At one year, babies weigh, on the average, three times as much as they did at birth, or approximately 10 kilograms.

Age		Weight
At birth	-	2.5 -3 kg.
12 months (1 year)	-	9-10 kg.
24 months (2 years)	-	11-12.5 kg.
36 months (3 years)	-	12.5-14.5 kg.

Height : By the time the baby is four months old, he measures between 21 and 23 inches; at one year, the average height is between 27 and 29 inches, and at two years, approximately 32 and 34 inches.

Age		Weight
At birth	-	18- 20″
4 months	-	21-
8 months	-	25-
12 months (1 year)	-	27-
24 months (2 years)	-	32-
36 months (3 years)	-	35-

PHYSICAL PROPORTION

Changes in body proportion are small during the first half year of life. Head growth slows down, while trunk and limb growth increases. Thus the baby gradually becomes more slender by the end of the babyhood.

Bones

Bone development follows the same general pattern as growth in size. Thus bone development is most rapid during the first year of life, followed by a period of relatively slow development during the second year. The number of bones in the body increases at this time. The soft spongy tissue of the bones of the new born baby gradually hardens at different rates in different parts of the body.

Teeth

The average baby has four to six milk teeth by the age of one year. At the end of the babyhood, the average baby has approximately 16 teeth. The first teeth to cut through are those in the front, the last to appear are the molars.

Age		Weight
6-8 months	-	2 Lower central Incisors
7-9 months	-	2 Upper central Incisors
8-10 months	-	2 Lateral upper Incisors
10-12 months	-	2 Lateral Lower Incisors
12-18 months	-	4 Premolars
18-20 months	-	4 Canines
18-24 months	-	4 Molars

Nervous system

It has been estimated that one fourth of the adult brain weight is attained at birth, one half by the age of nine months; and three fourths by the end of the second

year. The cerebellum which plays an important role in body balance and postural control, triples in weight during the first year of life. This is true also for the cerebrum.

Development of sense organs

The sense organs also develop rapidly during babyhood and are capable of functioning. With the development of the eye muscles by the third month, the baby is capable of seeing object clearly. The sense of hearing also develops rapidly during babyhood. Smell and taste which are well developed at birth continue to improve during babyhood. The thin texture of the baby's skin makes a baby highly responsive to all skin stimuli.

PHYSIOLOGICAL FUNCTION

Babyhood is the time to establish important physiological pattern of eating, sleeping and elimination.

Sleep patterns

During the first weeks of babyhood, a baby sleeps almost 8 hours during night time, which is increased to 10 hours at twelve weeks and then remains constant upto the age of 1 year. During the first three months, there is a decline in day sleep, which is balanced by an increase in night sleep.

Eating patterns

From birth to four or five months of age, all eating is in the form of sucking and swallowing. Therefore the food must be in the liquid form. The habit of chewing and biting develops after a month later, that is, at about the age of 6 months.

Food dislikes which begin to develop during the second year of life, is the result of the prolongation of sucking habit. After being accustomed to food in liquid form, it is difficult for babies to adjust to a semi solid food. This adds to their disliking to solid food even though they like the taste.

Pattern of Elimination

The habit of bowel and bladder control cannot be established until the baby's muscles and nerves are ready for them. Bowel control begins at six months on the average. Bladder control, on the other hand, is established between the ages of 15 and 16 months. But it is usually after the age of two years that babies are expected to have control of the bladder and can achieve dryness during the day time. Dryness at night cannot be achieved until a few years later in the average child.

COMMON EMOTIONAL PATTERN OF BABYHOOD

Emotion is a strong feeling, which is experienced at being sad, happy, afraid or anger. It is the natural way to express all kinds of feelings.

Emotional behaviour of an infant begins since birth, which is in the form of general excitement. As the baby grows older, this kind of emotion gives way to a variety of emotions like fear, anger, joy, curiosity etc. Mode of expression of emotions is also in the form of crying and screaming.

All these emotions are brief in duration. They appear frequently and give way to other emotions when the baby's attention is distracted.

The common emotional patterns which develop in babyhood include anger, fear, curiosity, joy and affection.

Anger : Anger is the most common emotion found during babyhood. Anything done against its wish gives rise to anger. Typically baby shows off his anger in the form of screaming, kicking, waving the arms, and throwing away anything that comes within his reach. During the second year, babies may also jump up and down or sometimes throw themselves on the floor.

Fear : The baby experiences the emotion of fear due to sudden harsh noise, strange persons, objects etc. In general, the things most feared at this age are animals, dark rooms, high places etc. Any situation which is different from what the baby is

accustomed to, give rise to fear. Typical fear response of babyhood consists of an attempt to withdraw from the frightening objects, accompanied by crying and temporary holding of breath or turning his head away and hiding his face.

Curiosity : The growing child wants to learn, want to find out about things for himself. This is a natural law. He is curious and wants to peep everywhere, wants to handle what he sees, wants to put everything he gets into his mouth to know how it feels.

A young baby expresses his curiosity by facial movement, opening his mouth and wrinkling his forehead. Later babies try to reach the objects that aroused their curiosity.

Joy : Joy is a form of pleasure or happiness. It is connected with physical well being and mental health.

Feeling of joy shows off from the time the baby is one month old. By the third month of life all situation will give rise to smiling and laughing. The most common situation causing laughter in the second year of life are tickling, playing with toys, funny sound, being played with by some one and so on. Joy is also expressed in the form of cooing, gurgling, or even shouting with glee.

There are definite age trends in the expressions of joy. At the age of 18 month the baby smiles mostly at his own activities. At two years, his smile is related to another person.

Affection : Anyone who plays with babies takes care of their bodily needs, shows them love, will arouse affection to babies. The emotion begins to show from the age of sixth or seventh month. Typically, babies express their affection by hugging, kissing, waving his arms, smiling and trying to raise his body to reach the person.

Motor Development

One of the most important developments during the early years of life is motor development, the development of control over the different muscles of the body.

Motor development begins before birth. From the end of the fourth month of pregnancy, the mother can feel the foetal movement inside the womb.

For the first few weeks after birth, motor development progresses at a rapid rate, though most of his movements are uncoordinated and involve mass bodily movement. It is after he gains control over his muscular mechanism that he makes specific movement.

Pattern of Motor Control

Development of control over the muscles follows a general predictable pattern. The approximate age at which muscles control appears in the different areas of the body are described below-

Head region : Control of the head muscles comes early in life. The movement of eyes, smiling, laughing and raising of the head are learnt soon. For a few hours after birth the child had no control on his eyes. But after four months, a normal child is able to show different movements of the eyes.

The baby can hold his head occasionally erect at the age of one month. It is at four months that he can raise his head off the shoulder and hold it so for more than three seconds. By the age of four to six months, most babies can hold their head up.

Trunk Region : At the time of birth the infant is not able to turn to sides or from back to the stomach. At two months it can turn from side to back, at four months from back to side and at six months from one side to another. It is at the age of 20 weeks that the infant can take to a sitting posture. At nine or ten month the baby can sit alone without support.

Leg Region : The infant learns to walk with some difficulty. First it learns to crawl. The crawling and creeping appear between eight and ten months. After the tenth month the infant learns to walk on the knees. The ability to stand up develops by the age of tenth month. After this the infant learns to walk and are able to do so with some support at the age of fourteenth month. It is at the age of eighteen month that a normal child can walk without any support.

Arms and Hand Region : The arms and hands of the infant are active since birth. But there is no coordination of movement in the beginning.

Independence working of the thumb which is necessary for the function of hand and fist, begins in the third and fourth month of life. At about five months the child could close its fist. It is around six or seven months that the child is able to pick up different things.

Most infants can put objects in its mouth at about the age of ten months. It is proved that, around ten months, the infant can hold his milk feeder and put it in its mouth.

The ability of putting on clothes develops at about one year of age.

PATTERNS OF SOCIAL BEHAVIOUR

Early social experiences play an important role in determining the child's social relationships with others. Six weeks to six months is termed as 'critical' in the development of good social behaviour.

The first social smile usually appears around the age of six weeks. Between the second and third month of life the baby's ability to distinguish people from inanimate objects develops which enable him to discover the one who supplies his needs. At this age, he shows his contentment if he is with people. All he wants is attention from some one.

Between the second and the third months, the baby begins to show interest in people. By the fourth and the fifth month the baby is anxious to be picked up by

anyone who approaches him. He smiles in response to the person who speaks to him, and a month later they can show different reaction to scolding, to smiling and to anger. During the sixth and the seventh month, the baby can differentiate between friends and strangers by smiling to the former and showing fear to the later. It is also the beginning of "the attachment age", the time when babies become strongly attached to their mother.

When the baby is eight or nine months old, he attempts, to imitate the speech, simple activities and gestures of others. At about the age of twelve months the baby can refrain from doing things in response to the warning from the adult. In the middle of the second year, negativism, in the form of stubborn resistance to requests and demands of adults normally appear. By the end of babyhood however the young baby can cooperate with adults in a number of simple routine activities.

A baby can recognise the presence of another child during his fourth and fifth month of life. In order to attract the attention of the other child, the baby bounces up and down, kicks, laughs, or blow bubbles. Between the ninth and the thirteenth month, interest in other babies increases. From the thirteenth to the eighteenth month, the baby's interest shifts from play materials to his playmates, resulting in a decrease in fighting for toys, but increasing his interest in playing with them.

SOME COMMON CONCEPTS OF BABYHOOD

Piaget, the noted psychologist, labeled the age from 0-2 years as the sensorimotor stage. The earliest knowledge of babies about things comes from his sensory exploration by looking at, listening to, touching it, smelling, and tasting anything they can. Later they gain more knowledge through handling whatever is within their reach.

Many of the important concepts needed for adjustment to life are learned during babyhood. The most important concepts that begin to develop during babyhood are as follows:

1. Concepts of Weight:

The concepts of weight are very poor during babyhood. A baby perceives a small object as light in weight and large one as heavy. Because of this error in perception, he frequently drops the thing he is examining.

2. Concepts of Space :

During the second year, babies can reach for objects which is within twenty inches, indicating that they are able to estimate distance.

3. Concepts of Time :

A baby has no idea of the length of time needed for a specific job such as feeding himself. He has no concept of time duration. It is at about the age of two years that the average baby knows and uses time indicating words like today, yesterday, etc.

4. Concepts of Self :

The physical self concepts develop first, followed by psychological self concepts. The baby discovers the meanings about his own body by looking at himself in the mirror and handling the different parts of his own body. Psychological self concepts are based mainly on what his parents and other significant peoples think of him. Before the end of babyhood most babies know they are either a boy or a girl.

5. Social Concepts

A child can distinguish between familiar and unfamiliar persons at five months of age. Accordingly he responds to their voices and facial expressions. He can distinguish angry, frightened, and friendly voices. However there is no evidence that even by the end of babyhood he understands exactly what these emotions are.

6. Concepts of Beauty

Between the ages of six and twenty four months, babies begin to respond to different colours. They are also able to say that is pretty. Babies like music and enjoy listening to lullabies.

7. Concepts of Comic :

At four months babies enjoy blowing bubbles in their milk and splashing their bath water. At six months they get enjoyment from dropping things and at one year they like to make funny faces. At two years they can laugh at their own funny images.

UNIT - IX

SOME COMMON AILMENTS OF CHILDREN

1. Indigestion

When the baby feels uncomfortable and cries miserably, and while passing the motion, shows sign of undigested food, then it is clear that the baby is suffering from indigestion.

Indigestion is usually caused by food which is too heavy for the child to digest. Over feeding also causes indigestion.

The normal signs of indigestion are Stomach upset, gas formation etc.

To overcome this condition, the baby has to be given lighter food. Plain water may be given in between the feed, to give rest to the digestive system. Gripe water which is found in the market may be given. As whole milk is heavy to digest, it has to be diluted by removing the cream and adding equal amount of water.

2. Diarrhoea

Diarrhoea is defined as the passing of loose, and watery stools. Diarrhoea is one of the commonest disease from which Indian children suffer in their early childhood. It is characterised by an increase in the frequency and fluidity of stool. The degree of severity is determined by the amount of fluid and vital chemicals lost from the body.

Causes : 1. Gastrointestinal allergy.

2. Infection of the stomach, intestine and very often infection due to intestinal parasites like Amoeba and Giardia.
3. The leftover milk of the bottle given to the child can cause diarrhoea.
4. Unhygienic food is taken by the child.

Management :

1. As diarrhoea starts one should reduce the quantity of milk fed to the child.
2. Children should be encouraged to take lots of fluids for example lassi, water, tea or any other beverage. This would prevent dehydration in the child.
3. When a child is recovering from diarrhoea, solid foods should be given slowly. The child is given of usual amount on the 1st day, $\frac{2}{3}$ on the second day and full amount on the third day.
4. ORS should be given to the child.

"Recipe of ORS"/Home made ORS

1 litre boiled water.

3 gms salt or $\frac{3}{4}$ teaspoon.

25 gms sugar or 5 teaspoon.

$\frac{1}{4}$ Lemon juice.

Method of preparation of ORS (Oral Rehydration Solution) :

In a jug containing 1 litre of preboiled water, put 5 teaspoonful of sugar and $\frac{3}{4}$ teaspoonful of common salt. $\frac{1}{4}$ lemon juice may also be added. Stir well to make a solution. O.R.S. (Oral Rehydration Solution) is ready to serve; prepared at home from easily available resources.

Control or Preventive Measures :

1. Oral Rehydration Therapy should be administered.
2. Breast feeding should be encouraged.
3. Boiling the bottle, utensils, keeping the flies away, covering the dustbins, flushing the toilets after use, and washing hand with soap are some of the methods of keeping the incidence of diarrhoea low.

3. Dysentery

Dysentery is the illness of passing unformed stools accompanied by the blood and mucous. The most common dysentery are (i) amoebic dysentery and (ii) bacillary dysentery. Amoebic dysentery is caused by amoeba (Entamoeba Histolytia) and bacillary dysentery is caused by Shigella Bacillus.

Causes:

1. Amoebic Dysentery :
    1. Entamoebic Histolytica is responsible for the disease.
    2. Unwashed hands carry the germs and enter our body with food.
2. Bacillary Dysentery
    1. Flies are one of the causes.
    2. Contaminated foods also cause it.

Symptoms of Dysentery :

1. There is a gripping pain in the abdomen.
2. Usually mucous stained with blood may be passed with stools.
3. Motions often have a very offensive odour.
4. Pain in colon area of abdomen.
5. There is inflammation of the large intestine.

Treatment:

1. All the utensils and feeders of the infant should be properly boiled and sterilized.
2. Hands should be washed before making or taking meals.
3. All toys and other items of the infants should be clean.
4. Milk and water should be properly boiled.
5. When the disease is controlled then, water or barley water, orange juice etc. should be given to the patient. If the child is taking solids encourage him to take rice, yoghurt khichri, boild potato, banana, apples, toast & biscuits. Avoid fruits like papaya, mango, guava etc. and green vegetables.

4. Constipation

When a person passes hard stool making him uncomfortable during defecation that condition may be called constipation. Constipation is a problem. If a child is not eating enough food or fluids because of fever or illness he may feel constipated.

Causes :

1. Irregular bowel habits may be due to getting up late in the morning.
2. Lack of fluids intake.
3. Lack of potassium in the diet.

4. Mental stress produces spasm of the colon.

Treatment :

If a child passes hard lumpy stools, increase the sugar and water content of his/her diet. Give them extra water along with milk, this will usually soften stools. Increase the amount of fruit and vegetables in order to get more roughage in the diet. If the child has abdominal pains with constipation consult the doctor.

5. Vomiting

Vomiting is not a disease but a symptom. It means forcible expulsion of contents of stomach. It is a reflex action, sometimes voluntary or involuntary on the part of a child.

Causes:

1. Excessive swallowing of air while bottle feeding or eating very fast.
2. Infection of the stomach and intestine causes continuous vomiting.
3. Emotional and Psychological factors.

Treatment :

Cold drinks, juices should be given. It is useful to keep proper water balance. Many children vomit when forced to eat against their will. If so, give the child semi-solid food which is thick and pasty, like cereal mixed with milk, Khichri and milk puddings.

6. Common Cold

Common cold is one of the minor ailments causing considerable discomfort among little babies.

Causes:

1. It is caused by allergic condition, it spreads very fast, from one child to another.
2. Exposure to cold and wet climate.
3. Conditions lowering the resistance of the child like poor diet, other diseases etc.

Symptoms:

1. Clear water or sometimes thick and yellow discharge from the nose.
2. There may be vomiting.
3. Loss of appetite.
4. Fever.
5. Breathing problems due to blocked nostrils.

Treatment :

1 . Always keep the baby warm and provide a warm drink.
2. Nasal drops can be given for blocked nose.
3. Child should be taught to blow off the nose.
4. Steaming can be done.
5. If fever develops consult a doctor.

7. Colic pain

Colic is defined as spasm accompanied by pain. Sometimes baby cries regularly due to Gastro intestinal gas build up. The unexplained crying is also a symptom of colic and also known as three months colic, because, it occurs frequently in the first 3 to 4 months.

Infant cries when he/she is wet, cold, hungry or lonely and when he/she wants a feed. An Infant usually draws up his legs up, becomes red and screams in pain. It is believed that babies behave in this way because they swallowed air while feeding. It occurs commonly in bottle fed babies.

Causes:

1. Vigorous crying and sucking.
2. Eats rapidly and swallows air.
3. When burping is not done after feeding an infant.

Treatment:

1. Pain relieving drugs/Anti spasmodic drops.
2. Burping should be done after feeding.
3. Avoid the child to suck the bottle after the feeding, as he may suck additional air which can cause colic pain.

8. Jaundice

Epidemic jaundice or infectious hepatitis is an acute infectious disease caused by hepatitis. Incubation period is 15-30 days. Jaundice is very common in India and may sometimes occur in epidemic due to contaminated water, bad sewage system and exposed food.

Symptoms : Yellow colouration of eyes, skin and urine.

Poor standard of living, poor sanitation and hygiene are responsible for the occurrence of jaundice.

Treatment:

Hand washing with soap before and after toilet. Avoid to take contaminated water and food. Boiled water should be advocated for drinking purposes.

9. Convulsion

Convulsion or fits means uncontrolled twitching or jurking movements of arms, and legs with twitching and upturning of the eyeballs, the child may clench his teeth and become unconscious.

Treatment :

Lay him on his back on a bed. Do not pick up or pat the child. Turn his head to the left or right, so that the secretions can flow out and the tongue does not fall back into his throat, obstructing the opening of the wind pipe. If the convulsion is prolonged for more than 10-15 minutes take the patient to the nearest hospital.

10. Measles

Measles is caused by virus. The disease is accompanied by cold, cough, watering of the eyes and high fever for nearly 3 to 4 days. This is followed by a rash which is like insect bites with reddish spots. One or two days after the appearance of rash, the fever generally subsides.

Treatment :

Measles vaccine is a must for all children at about nine months of age. A child suffering from measles should generally avoid looking directly at a bright light because his eyes will hurt. If your child who has not been immunized so far is exposed to a case of measles, consult your doctor.

11. Nappy rash

Infants and young children are especially prone to skin problem. The red rash with many tiny blisters appears on the skin surface.

A nappy is a piece of clothe usually wrapped around a baby's bottom and between its legs to absorb and retain urine, and faeces etc.

Causes :

A Nappy rash is caused by the soiled nappy as the skin remains for a long time in contact with the urine and faces inside the soiled nappy. Sometimes rashes may also accompany infections like measles.

Treatment :

Use lotion or ointment prescribed by a doctor. If nappy rash persists, leave the baby exposed without wearing nappy for few hours. Cleaned the baby's skin

well and dried with a soft flannel and powdered the spot (genital area) and nearby area. Nappies should be given a final rinse in weak vinegar solution and dry it.

12. Immunization

One of the most practical ways of preventing a disease is Immunization. Immunizing agent is specific for a particular disease. They protect our body against that particular disease only. In rare cases a person may get a disease in spite of immunization. In such an event, only a mild form of that disease may manifest.

Immunization schedule may vary from one region to another depending upon the regional problem. Government of India launched various immunization programmes from time to time to encourage the immunization on a mass scale. WHO (World Health Organisation) has formulated the Immunization chart for children which is given below -

Table I

Immunization schedule chart of a child

1 .	Birth to one week	B.C.G. vaccine.
2.	$1\frac{1}{2}$ month	D.P.T. (1st vaccine) Polio drops (first dose)
3.	$2\frac{1}{2}$ months	D.P.T (2nd vaccine) Polio drops (2nd dose)
4.	$3\frac{1}{2}$ months	D.P.T. (3rd vaccine) Polio drops (3rd dose)
5.	9 months	M.M. R (Measles, Mumps, Rubella)
6.	16-24 months	D.P.T. (booster, vaccine) Polio drops booster
7.	2 years	Cholera, Typhoid
8.	5-6 years.	D.P.T booster, Typhoid booster
9.	10 years	Titanus, Typhoid
10.	16 years	Titanus, Typhoid booster

Precaution:

1 . We must keep a record of immunization given to our child.

2. If the child is having high fever or any acute illness, do not give the vaccine till the child is better. Or it is better to consult a doctor regarding the schedule of immunization.

Vaccination

Vaccination is the process of introducing vaccine into the human body to give protection against disease. It may be by way of injection or given by mouth.

Vaccine is a substance designed to produce specific protection against a particular disease. It stimulates production of antibodies and thus provides immunity against disease. Vaccine may be of different types depending on how it is prepared. Live vaccines are prepared from live but modified organisms such as BCG, Measles, oral polio, mumps vaccines. The other type of vaccines are prepared from inactivated or killed organisms; examples whooping cough, cholera, rabies, plague vaccines. The toxoids are vaccines for protection against tetanus and diphtheria.

Some vaccines are of combination type such as D.P.T. (Diptheria Pertusis Titanus) and MMR (Measles, mumps, Rubella). The advantage of such mixed vaccines is to simplify inoculation process because a single injection of D.P.T. gives protection against three diseases Diphtheria, pertusis and Titanus.

QUESTIONS

1. Who are babies.?
2. Describe the nature of growth in height and weight of babyhood.
3. Describe the sequence of motor development in the different organs of the body during babyhood.
4. How does the physiological pattern of eating, sleeping and elimination established during babyhood ?

5. How does the emotion of fear develop in children ?
6. How does a baby show off his anger ?
7. Describe the early forms of social behaviour of babyhood.
8. How does a baby gain the knowledge of things around him ?
9. How does the concept of self develop in baby ?
10. State the common symptoms of diarrhoea.
11. State the method of ORS preparation at home.
12. How can you prevent diarrhoea of a child ?
13. Mention the types of dysentery.
14. What are the symptoms of dysentery ? Suggest the preventive measures to be taken against the spread of dysentery.
15. Name the food items which can prevent constipation in childhood.
16. What is vomiting ?
17. State the remedial measure of spreading common cold in childhood.
18. How will you apply first aid measure to a child who is complaining of colic pain.
19. What are the main causes of spreading jaundice in children ?
20. Describe the first aid treatment of a child suffering from convulsion ?
21. What are the visible signs and symptoms of measles ?
22. What is nappy ? How can you manage a nappy wash ?
23. What is vaccination ?
24. Plan an Immunization schedule of a child.

UNIT - X

TEXTILE FABRICS

Definition of Fibre :

What is fibre ? A fibre is a natural thread like structure. Fibres are the basic units in making textile yarns and fabrics. They are spun into thread which can be woven into cloth. Fibres may be from natural sources or man-made. Natural fibres are subject to lack of uniformity due to weather conditions, nutrition or soil fertility and disease. As it is possible to control the entire production process, man made fibres are more uniform in size and in other characteristics.

With the development of science, textile industries developed and different fibres came into existence. It is important that a textile fibre should possess sufficient length, strength and cohesiveness to allow them to be made into a continuous length suitable for fabric construction.

There are two classes of fibres according to length (a) Filament and (b) Staple.

(a) Filaments

Filaments are natural or man made fibres of continuous length, measurable in yards or metres. Silk and all the man made fibres are filaments. Yarns made from filament fibres are of two types, they are mono filament and multi filament.

Mono filament yarns are made of a single solid, strong and smooth strand. Multi filament yarns are composed of a number of tiny filaments twisted together. Yarns of multi filament contribute towards smoothness, softness, lustrous texture with good pliability.

(b) Staple

Staple fibres are short in length and measurable in centimetre. The length varies approximately between 2cm. to 4cm. or so. All the natural fibres except silk are staple fibres, however man made fibres are cut into short lengths and known as staple fibres.

The word 'textile' comes from the Latin word meaning 'to weave'.

The classification of Textile Fibres on the basis of their origin are as follows:

Textile Fibres

Natural				Man-made or artificial or synthetic
Vegetable	Animal	Mineral	Metal	Rayon
Cotton	Silk	Asbestos	Gold	Nylon
Linen	Wool	Fibre glass	Silver threads	Dacron
Jute				Terrylene
Hemp				Acrylic
Kapok				
Coconut fibre etc.				

CHARACTERISTICS OF DIFFERENT FIBRES

COTTON

Cotton is a cellulose (vegetable) fibre and is the most widely used textile fibre. Cotton is the fibre that covers the seed of the cotton plant. It is short, its length ranging from 1cm. to 5cm. It can be made into strong yarn as the natural twist in the fibre helps it to hold together.

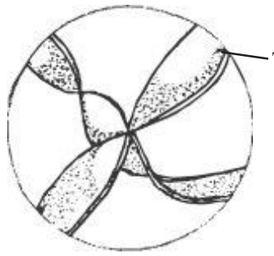


Fig. 1.1 A Cotton Fibre

Under the microscope it is seen as flat and twisted like a twisted ribbon (See Fig. 1.1 Cotton Fibre).

Cotton has less elasticity than that of silk or wool. It absorbs moisture quickly and dries quickly. It can withstand high temperature, boiling water and frequent laundering.

Cotton is a good conductor of heat. It does not take in dyes as readily as silk or wool. It is sensitive to the action of acids.


Fig. 1.2 A Silk Fibre

SILK

Silk is an animal fibre produced by the caterpillar called silkworm of a whitish coloured moth. The silk fibre spun by the caterpillar is from 270 to 1400 metres in length. It is a protein fibre.

Silk fibre has a double rod like structure. (See Fig. 1.2 Silk Fibre)

Silk fabrics are smooth, lustrous and not fluffy. It absorbs moisture very readily. Dyestuffs are also absorbed by silk fibre.

It is a poor conductor of heat. Strong alkalies have a harmful effect on silk but weak alkalies such as borax or ammonia can be safely used. Dilute acids do not damage silk but strong acids will dissolve it.

Silk has an excellent sewing and draping qualities, versatility, rich feel and texture.

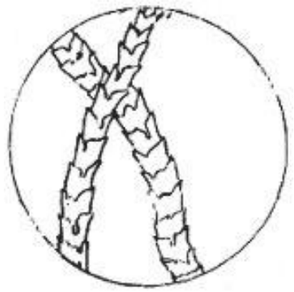


Fig. 1.3 A Wool Fibre

Wool

Wool is also a protein fibre. It is the only fibre which contains sulphur besides hydrogen, nitrogen, oxygen and carbon.

Wool fibre ranges from 5 to 45cm. in length.

Under the microscope a wool fibre resembles a worm with horny scales (See Fig. 1.3 Wool Fibre)

It is a bad conductor of heat. Hence woollen garments keep the body warm.

Wool fibre has a great affinity for most of the dyes. Alkalies have a harmful effect on wool. It makes the fibre yellow, hard and cause felting.

Concentrated acids will weaken and destroy the fibre but dilute solutions have no harmful effect.

Fig. 1.4 A Nylon Fibre

NYLON

Nylon fibre is the first man made fibre to be built up from chemicals in a laboratory.

Under the microscope it looks like a glass rod. Nylon is the strongest fibre known. (See Fig. 1.4 Nylon, Fibre). It absorbs very little moisture and so dries very quickly after washing.

Nylon is a poor conductor of heat. It is very sensitive to heat, therefore fabrics made of nylon require care while pressing (ironing).

It is resistant to weak acids and strong alkalies. Moulds, bacteria and moths do not affect the fabric. Nylon fibre is not resistant to bleaching. Strong sunlight or long exposure to light injures nylon.

YARN CONSTRUCTION

YARN (DEFINITION)

The raw materials for weaving or knitting of the fabrics and garments are yarns or threads, suitable for the article to be produced.

A yarn is a strand of fibres laid or twisted together by a process called spinning. Yarns may be made from any one or a mixture of the many different natural and man made textile fibres now available in the market of the world. Each of these fibres has its own characteristic properties and each is therefore best suited for the particular use of the woven cloth.

Cotton is known for its absorbing, wool for warmth, silk for feel and appearance. In the range of man made fibres, cellulosic rayon yarns are nearest to the natural fibres, although they cannot fully replace them. They have a silky feel and appearance. Similarly, the synthetic fibres have each of their own intrinsic properties such as strength, lustre, crease resistance, handle and draping properties. Mixtures of these natural and man made fibres have enabled the spinners to produce a still wider variety of yarns and fabrics for domestic and industrial uses of today.

When a weaver selects a yarn for a fabric, he looks for such characteristic properties as thickness of the yarn, its eveness and cleanliness, its strength and elasticity, its twist etc. Each of these properties may add to or impair the quality of the fabric which is required to be woven. In short, the first requirement for quality fabrics is the use of quality yarn.

YARN MAKING METHODS

Yarns used for weaving or knitting may either be in the form of continuous filaments or in the form of staple short fibres twisted together.

FILAMENTS

The continuous filaments of pure silk are extruded from the mouth of the silk worm and wound round a cocoon. Similarly, viscous liquids are made to squirt out of small jets or orifices to obtain filaments of rayon and synthetics. These filaments are smoother and more regular and lustrous than the twisted yarns.

STAPLE YARNS

Loose and entangled fibres of varying lengths and thicknesses are first separated, cleaned, and mixed for uniformity. These fibres are then straightened out, parallelised, drawn out into a rope like form and then into a thinner roving and still further twisted in order to bind the fibres together and give the yarn the necessary strength. Depending on the number of fibres laid in the cross section of the yarn and the thickness of the fibres, yarns may be spun coarser or finer to suit the qualities of the cloth to be woven.

For carrying out the various processes mentioned above, a wide range of different types of machines and a great variety of methods are used. Some of these processes are called opening, mixing, carding, combing, drawing and spinning etc.

The important physical properties of yarns depend largely on how these processes are carried out. A hand spun yarns for instance cannot be compared with machine spun yarn because of the limited number of process and the crude methods that are used.

Most of our fabrics are made from yarns with ordinary twist. This is the amount necessary to hold the fibres close enough together to prevent them from slipping apart and thus strengthening to the yarn. The amount of twist is measured by the number of twists per inch (t.p.i).

Low twist is 0 -3 twists per inch.

Ordinary twist is 3- 7 twists per inch.

High twist is 7 -12 twists per inch.

(See Fig. 2.1 Yarn twist)

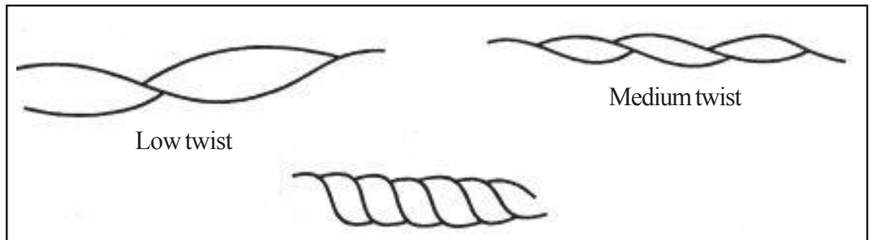


Fig. 2.1 Yarn twist

The twist in the yarn may be put either to the right Z or left S. The position of the fibres on the yarns indicates whether the yarn is Z or S twist. Regular weaving yarns are usually Z twists. (See Fig. 2.2 Z and S twists)

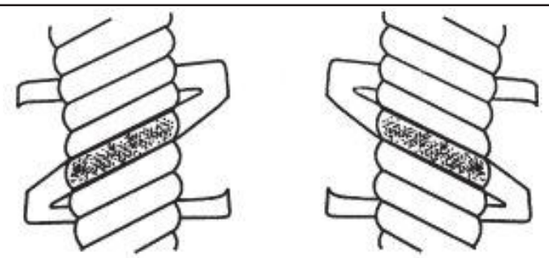
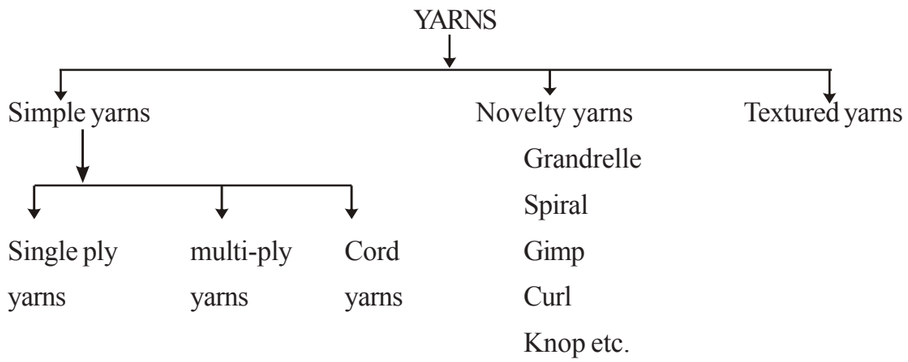


Fig. 2.2 Z and S twists

S twist - right hand and clockwise.

Z twist - left hand and counter clockwise.

CLASSIFICATION OF YARNS



Yarns are categorised depending on the number of strands used in yarn formation and the method of spinning.

Yarns are broadly classified into the following three classes:

1. Simple yarns or Ordinary yarns.
2. Novelty yarns or Complex yarns or Fancy yarns.
3. Textured yarns.

1. Simple yarns or Ordinary yarns.

These are spun from any of the natural or man made fibres but which are of regular throughout their length and in their physical properties. A simple yarn is alike in all its parts. A single yarn is a strand of fibres all twisted in the same direction. No decoration elements are introduced into the yarns during spinning. According to the number of strands present in the yarns simple yarns have been further divided into three sub classes. (See Fig. 2.3)

(a) Single ply yarns
(b) Multi ply yarns
(c) Cord or cable yarns.

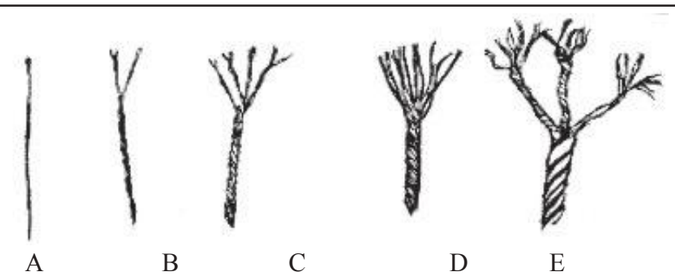


Fig. 2.3 Simple yarns
A, single strand; B, two ply; C, four ply; D, multiple strand; E, cable (three strands of multiple strand)

(a) Single ply yarns:

A single ply yarn is the most basic assemblage of fibres either staple or filament suitable for the operation involved in the making of the fabrics. Single ply yarns that are used for making fabrics are stronger as these are highly twisted.

(b) Multi ply yarns :

Multi-ply yarns are made by spinning together two or more than two single yarns. They are twisted or piled together. If two single yarns are twisted together, the resulting yarn is known as two ply yarn, if three are twisted together, three ply yarn and so on.

(c) Cord or Cable yarns:

Cord or Cable yarns are made by twisting two or more ply yarns together.

2. Novelty yarns or Fancy yarns or Complex yarns:

Novelty yarns have a regular cycle of uneven arrangement and may be unlike in any part. They are made on spinning machines with special arrangement for giving different tensions and rates of delivery to the different ply to allow loose,

curled, twisted or looped areas thus creating patterns in the yarns. Different counts, colours and different materials are combined in various ways in these fancy yarns.

Complex ply yarns are usually composed of the following : a base, an effect and a tie or binder yarns. The base yarns control the length and the stability of the end product. The effect yarns form the design or effect. The tie or binder yarns hold the effect yarn so that it will remain in position.

Grandrelle yarns are composed of two or more different coloured threads twisted together.

Spiral yarns composed of two threads twisted tightly together round which a soft spun thread is twisted spirally.

Gimp yarns consist of a central hard twisted thread and a soft spun thread, which is given in more rapidly than the centre thread.

Curl or Loop yarns consist of a fine foundation thread, a soft spun thick thread which forms loops at intervals and a fine binder thread.

Knop or Knot yarns are composed of one or two foundation threads which are twisted with a third thread but the latter, at intervals, is wrapped round and round the former to produce lumps or knops.

Cloud, Slub or Flake yarns are composed of two foundation threads with which pieces of short fibres, twistless slivers are twisted at intervals.

3. TEXTURED YARNS

These may be from either filament or staple fibres. There are three types of textured yarns : stretch, modified stretch and bulked.

Stretch yarns have extremely high levels of elastic extensibility and recovery.

Modified stretch yarns have some degree of stretch but they have been stabilized by processing to control the stretch.

Bulked yarns are special textured yarns designed to contribute bulk to the fabrics. These yarns have moderate to low levels of stretch and they have fluffy, bulky properties. Textured yarns offer a variety of appearance. They may be bulky or fluffy or they may be somewhat smooth and fine. Most textured yarns are manufactured from thermoplastic fibres.

FABRIC CONSTRUCTION

WEAVING:

Weaving is a method of fabric construction in which at least two sets of yarns are interlaced at right angles. Primitive people may have observed the interlacing of grasses and twigs in the nest of birds and thus discovered how they could make clothing for themselves. Now a days yarns of every fibre which we have learned to use in cloth are woven. Drawing of a simple loom is shown in Fig. 3. 1.

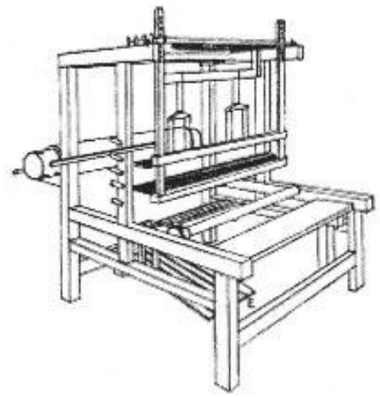


Fig. 3.1 (a) Drawing of simple loom, showing important parts, A, warp beam; B, harness, C, reed; D, cloth roll; E, foot pedals

Preparation for Weaving

Fabrics or garments are manufactured either by weaving, knitting or felting. In weaving operation, the lengthwise yarns which run from back to the front of the loom form the basic structure of the fabric and are called ‘warp’: The crosswise yarns are the ‘filling’ also referred to as ‘weft’ or ‘woof’. The filling yarns undergo less strain when the weaving is done. The term 'end' for warp and 'picks' for filling are the words used in textile industry.

Until the early 18th century weaving was primarily a hand or manual process. In the late 1700 and early 1800, scientists and inventors like Joseph Marie Jacquard and Edmund Cart Wright developed the weaving looms that were partially machine powered. Later they manufactured and produced looms that were entirely mechanical and power driven. During the late 18th and early 19th century, development of weaving involved the addition of automatic features to the existing looms to increase the speed of operation and to reduce the frequency and amount of damage due to faulty functioning.

The parts of a Basic Loom

These are as follows :

(1) **The Warp Beam** holds the lengthwise yarns. It is located at the back of the loom and is controlled so that it releases yarn to the loom as it is needed.

(2) **The Heddles** are the wires or metal strips with an eye located in the centre through which the warp ends are threaded (See Fig. 3.2 A heddle.)

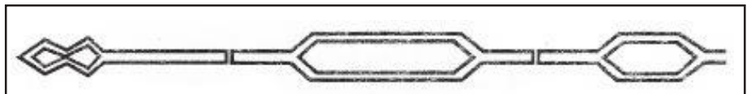


Fig. 3.2 A heddle

(3) **The Harness** is the frame that holds the heddles in position. Each loom has two harnesses at least and may have twenty or more. Harness can be raised or lowered in order to produce the shed through which the filling thread is passed and thus control the pattern of the weave (See Fig. 3.3 Harness).

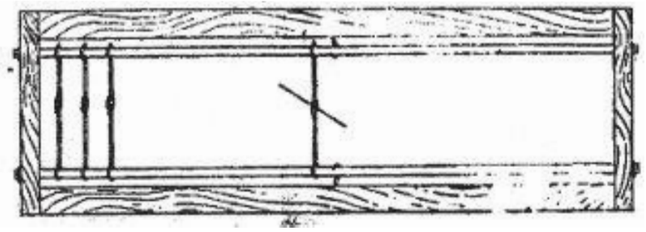


Fig. 3.3 The harness, consisting of heddles and the frame

(4) **The Shuttle** holds the filling or the weft yarn and is passed backwards and forwards across the loom. (Fig. 3.4 A shuttle)

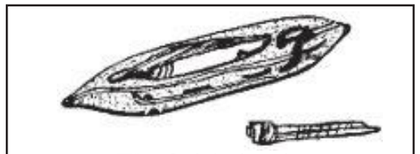


Fig. 3.4 A shuttle

(5) **The Reed** is a frame which is located directly in front of the harness. This frame pushes forward each time the shuttle passes in between the warp yarns and presses back the filling thread in position (Fig. 3.5 A reed)

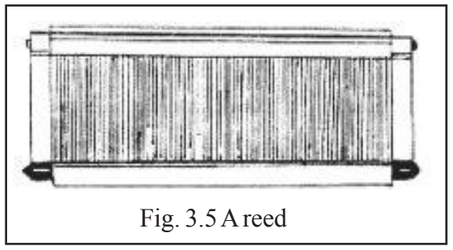


Fig. 3.5 A reed

(6) **The Cloth Beam** is located at the front of the loom and holds the completed fabric.

The basic Weaving Operation consists of Four Steps :

1. **Shedding** : On a primitive loom, the weaver had to raise each alternate warp yarns with his finger or stick to insert the filling yarns into the warp. Weaving was therefore very slow process. The raising of alternate warp yarns formed an inverted V opening or shed through which the filling yarn was inserted. The first weaving operation therefore came to be known as shedding.

2. **Picking** : It is the actual procedure of placing the filling yarns into shed. The shuttle or other device moves across the shed laying the pick or filling as it goes. A single crossing of the filling from one side of the loom to the other is known as pick.

3. **Beating up or Battening** : A warp yarn passes through the heddle eyelets and through opening in another frame that resembles a comb called reed. With each picking operation the reed automatically pushes or beats each filling yarn against the portion of the fabric that has already been formed. This essential weaving operation is therefore called beating up or battening. It gives the fabric a firm compact construction.

4. **Taking up and Letting off** : With each shedding, picking and battening operation, the newly constructed fabric must be wound on the cloth beam. This process is called taking up. At the same time the warp yarns must be released from the warp beam. This is referred to as letting off.

These operations continue till the desired length of cloth is obtained.

SELVEDGES

In most of the materials, the edges which are known as selvedges, are made with heavier and more closely placed warp yarns, so that they do not ravel easily.

The width of the selvedges varies from 1/4 of an inch to ¾ of an inch. The yarns are usually the same as those in the rest of the fabric except that they are made firmer and stronger.

COUNT OF THE CLOTH

Count is the technical term used to indicate the number of warp and the weft in one square inch of fabric as it comes from the loom.

BALANCE OF CLOTH

The balance of fabric is determined by the proportion of warp yarns to weft yarns. If the number of warp and weft yarns is nearly the same in a square inch, the fabric has a good balance.

A fabric with a poor balance when held in the light will show yarns running in one way i.e. lengthwise only. Such a fabric is not good as it does not stand hard wear and many washings.

CLASSIFICATION OF WEAVES

The manner in which groups of warp yarns are raised by the harness to permit the insertion of filling yarns determine the pattern of weave and in large measure the kind of fabric produced.

Basic looms once had only two harnesses but today most looms have several harnesses so that one loom can weave a variety of fabrics.

The basic weaves used in fabric construction are : Plain weave, Twill weave and Satin weave. These are the foundation weaves and form the basis of all the other types e.g. Double, Pile, Jacquard, Dobby, Swivel etc.

1. PLAIN WEAVE

It is the simplest form of weaving. It consists of alternate interlacing of warp and filling yarns, one warp up and one down along the entire width of the fabric. This weave resembles the process of darning. This weave is also known as homespun cotton or tabby weave. The simplest loom for plain weave has two harnesses, unless it is printed or has a surface finish. It has no right or wrong side. (See Fig. 4.1 Plain weave)

Plain weave is used in the construction of fabrics from almost all textile yarns, as it is cheapest to produce. It is the most serviceable of all weaves, as fabrics with this weave are easy to wash, dry clean, wear well and are comparatively inexpensive.

PLAIN WEAVE VARIATION

(i) Rib weave

This is a variation of plain weave. In this, heavier yarns are used in the warp than those in the weft and this produces a ribbed effect. Sometimes the order is reversed and the heavier yarn is used in the weft.

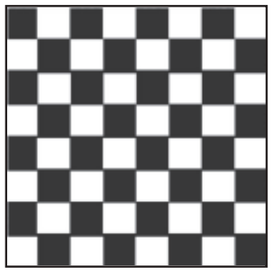


Fig. 4.1 Plain weave

Ribs may be woven lengthwise or crosswise of the fabric. The lengthwise ribs in the direction of the warp are formed by the filling yarns passing alternately over and under a group of warp yarns. It is called filling rib weave.

The crosswise ribs, in the direction of the filling, are formed by the warp yarns passing alternately over and under a group of filling yarns. This is called a warp rib weave, e.g. poplin.

(ii) Basket weave

Basket weave is a balanced weave. Basket weave is made up of two or more filling yarns passing over and under two or more warp yarns. The basket may be three by three or four by four or many other balanced arrangements. Very attractive fabrics may be woven in the plain basket weave by the use of coloured yarns. But this weave produces a loose fabric, which is not suitable for hard wear, e.g. monk's cloth, but is used as materials for sport coats and suits.

TWILL WEAVE

These include a wide range of weaves and are the most durable of all weaves.

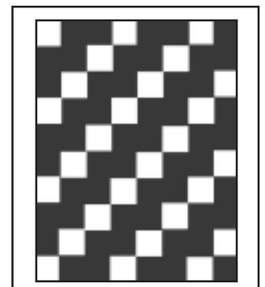


Fig. 4.2 A Twill weave

In the twill weave, the filling yarns float over and under the warp yarns in regular variations to form diagonal lines.

When the direction of the diagonal starts from the upper left hand side of the fabric and moves down toward the lower right, it is called a left hand twill. When the direction of the diagonal starts from the upper right hand side of the fabric and moves down toward the lower left, it is called a right hand twill. (See Fig. 4.2 A twill weave)

Variations of the twill weave are the herring bone twill weave, the broken twill weave, and the zigzag twill weave. Examples of twill weave fabrics are jean, drill, khaki, sergi etc.

3. SATIN WEAVE

The object of satin weave is to produce a solid face on one side of the cloth so as to give it a smooth and generally lustrous surface. Satin fabrics are characterised by long floats on the surface. If more warp yarns show on the surface, it is called a warp face or satin weave. Satin is the name of the weave as well as the fabric woven in this weave. Satin was originally of silk fabrics with warp predominating on the surface. (See Fig. 4.3 A Satin weave.)

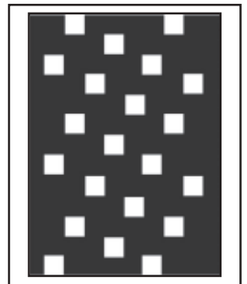


Fig. 4.3 A Satin weave

SATEEN WEAVE

It is the reverse of the satin weave. If more filling yarns show on the surface it is called a filling face or sateen weave. The simplest satin or sateen require a

minimum of five harnesses on a loom. The resulting fabric, the simplest sateen is called a five shaft sateen (See Fig. 4.4 A Sateen weave).

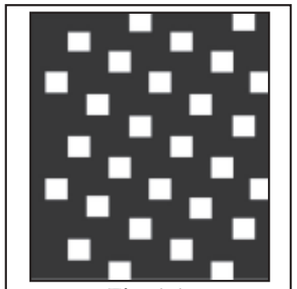


Fig. 4.4
A Sateen weave

To differentiate between satin and sateen weaves, fingers are passed over the cloth to determine the direction of the floats. If the fingers run smoothly and easily along the length of the fabric, thus indicating the presence of the warp floats, the weave is satin. This weave is most commonly used in silks and rayons. Satins are extremely lustrous and smooth. The sateen weave will have floats running on the cross side of the fabric. This weave is used in a few mercerised cotton fabrics. These fabrics are not so lustrous or smooth as satin.

KNITTING

Only one thread is used in this process. The yarn is wound round a needle to form loops which forms one row. This row of loops is caught by another row of loops and so on till a continuous length of cloth is made. The popularity of knitting has grown tremendously with recent years because of the increased versatility of the techniques, the adaptability of many new man made fibres and the growth in the consumer demand for wrinkle resistant, stretchable, snug fitting fabrics particularly in the greatly expanding areas of sports wear and other casual wearing apparel. Now a days, the usage of knitted fabrics range from hosiery, underwears, sweaters, slacks, suits, coats to rugs and other home furnishings.

FELTING

This process is possible only with the fibres which can stick to one another firmly when pressure is applied and thus forms a cloth, e.g. felted wool. The peculiar construction of the woollen fibre, which is surrounded by scales and the natural gummy fluid present in it makes this possible and successful.

Felting is the massing and flattening together of many fibres by beating and by applying pressure or steam to the fibres.

This is a type of fabric in which there is no interlacing of yarns to give stretch or character. It is not made with yarns at all but with loose fibres.

Felt fabrics are used for wearing apparel, home furnishing items, crafts and decorative accents and industrial purposes.

UNIT - XI

SELECTION OF CLOTHES

Men clothed themselves from a very early age. First they started clothing with the natural coverings of other animal skins and feathers or used the bark or leaves of trees. Their first desire may have been to keep themselves warm or to adorn themselves. Later came the ideas of fashion and decency, with the progress of the human race, to fulfil the desire of clothing more and more countries like China, India and Egypt started the manufacture of what we call the textiles today.

FUNCTIONS OF CLOTHING

1. Clothing is necessary to protect the body from external injuries and from the ravages of climate and weather. Clothing also helps to prevent certain disease germs and parasites from entering the body.
2. Clothes are worn for comfort both physical and mental. The average person is more relaxed if he has the right clothing on his body.
3. It is worn for maintaining the normal body temperature.
4. Clothing helps to give the individual an agreeable form. It conceals the body deformities.
5. Clothing enhances beauty. The artistic urge of the individual can be satisfied when he or she selects attractive fabrics or pleasant colours, lines and designs.
6. Clothes may be so worn as to make the individual more attractive or to attract the attention of others.

7. Clothing can be a means of self expression, a manifestation of one's aesthetic qualities and an outlet of one's creative ability.
8. Being well dressed gives one a feeling of security and at the same time enhances one's looks and personal charm.
9. A well dressed person has poise, looks smart and neatly groomed, and psychologically can move in any society without a feeling of inferiority.

IDENTIFICATION OF DIFFERENT TEXTILE FIBRES

Fibre identification is an important as well as an interesting topic. The variety of fibres which modern science has discovered or invented with various methods and processes adopted in the manufacture and finishing of fabrics are making their identification more and more difficult. Besides, the consumer is interested in knowing the fibre content, which ultimately effects the durability, appearance, comfort and suitability for laundering and usage.

The following are some of the tests which can be carried out easily-

LABELS

If the label gives the fibre content and tells how to take care of the fabric for satisfactory wear, the consumer is most well equipped to recognise the textile fabric she is purchasing. Unfortunately there is no standardisation in labelling in India and if there is any label the information is incomplete.

VISUAL INSPECTION

The first step in identification of a fibre is always inspection of a fabric for appearance and feel of the hand. The ability to identify the fibre by mere touch needs long experience and keen perception.

Grasp the edge of a cloth between the thumb and the index finger with the thumb and the fore finger across the cloth, lengthwise and then in a circle. Feel for pliability,

elasticity, warmth, softness, smoothness, body and hand.

Generally vegetable fibres are usually cooler to touch than animal fibre or synthetics.

BURNING TEST

It is a simple but a reliable test. It can be conducted along with the visual inspection. It may not be able to identify a fibre in particular but it can indicate the group, such as cotton and linen will have the same results when burnt.

General directions for the burning test :

1. Ravel out and test several yarns from each side of the fabric to see whether they have the same fibre content. Differences in lustre, twist and colour will indicate the presence of two or more kinds of fibre in the fabric.

2. Ignite a piece of fabric and note

(a) How it burns

(b) Amount and shape of ash

(c) Odour

(d) Type of flame

Fibre	How it burns	Amount and shape of ash	Odour	Type of flame
{Cotton, Flax}	Burns steadily And quickly	Firm soft grey ash, smooth edge	Smell of burning paper	Not Self-extinguishing

Fibre	How it burns	Amount and shape of ash	Odour	Type of flame
wool	Does not burn readily	Solid black crushable ash	Smell of burning hair	Self - extinguishing
Silk	Burns very quickly	Grayish black Hard crust	Smell of Burning hair	Self - extinguishing
Nylon	Does not burn but melts	Melted white residue which sticks on to the surface	Smell of chemical odour	Self - extinguishing

MICROSCOPIC TEST

A knowledge of fibre structure obtained by seeing the fibres under the microscope and observing some of the differences among fibres in each group, is of great help in understanding a fibre and fabric behaviour.

Tear out a fine fibre from the material to be tested and mount it, on a slide with either water or a mixture of glycerol and water in the proportion of 1:10. Then fix the slide on the microscope and examine the fibre under high and low power and make a note of what is observed.

LONGITUDINAL VIEW OF FIBRE

COTTON (See Fig. 1.1 Page 116)

1. Flat fibre
2. Ribbon like twist
3. No crimp
4. Central lumen
5. No lustre

SILK (See Fig. 1.2 Page 116)

1. Rod like structure
2. Circular
3. High luster
4. Gum present on surface
5. No crimp

WOOL (See Fig. 1.3 Page 117)

1. Rough surface
2. Crimp very evident
3. Scales present
4. More or less circular
5. Lack of lustre

NYLON (See Fig 1.4 Page 117)

1. Round rod like structure
2. Smooth surface
3. Translucent
4. High lustre
5. No crimp

SOLUBILITY TEST

Some fibres look very similar under the microscope and a solvent test may be needed to complete identification. These tests are of confirmatory tests along with microscopic test. Solubility test are very useful in fibre identification. Location of the fibres in a blended fabric and also the quality of different fibres in blends can be identified by dissolving out each component of a particular fabric.

Solubility test may be done on a slide under the microscope so that the results could easily and definitely be observed. The following chart gives a list of fibres and their solvents that dissolve them.

Sl. No.	Fibre	Solvent/Solution	Result
1 .	Cotton	1. Cuprammonium hydroxide 2. Iodine	Partially dissolved Blue colour etc.
2.	Silk	Strong sulphuric acid	Dissolves
3.	Wool	5% Caustic Soda	Completely dissolves
4.	Nylon	90% Phenol	Completely dissolves
5.	Rayon	Cuprammonium hydroxide	Completely dissolves

FACTORS AFFECTING THE SELECTION OF DIFFERENT CLOTHES

Clothes count for most of us. Right clothes are necessary for health, poise and self respect. There are a wide variety of colours, designs and materials for the individuals to select for their clothing. Some people have the natural ability to choose the colour, design or fabric which best enhances their appearance; others must acquire this ability. In order to wear becoming clothes, consideration must be given to the personality of the individual and his figure and then to the design, the fabric and the colour of the cloth.

The selection of clothing should be done on the basis of age, occupation, occasion, fashion, figure, health and comfort, season and income etc.

1. Age

While selecting a fabric one has to think of the age group of the individual.

For small children, dainty prints in soft colours can be choosen, when the children enter late childhood stage, the boys like masculine colours, such as blue, greyish blue and brown. Girls like to wear feminine colours like pink, green, red etc.

Some fabrics which are delicate are chosen for girls' clothing whereas, rough textured fabrics are suitable for adolescent boys. The style of the dress also changes according to the age group of the child.

2. Occupation

Clothing items depends upon profession of a person. A working woman needs more clothes as compared to non working women. Variety of clothes is also more in case of a woman as compared to man. Clothes for daily wear should be simple, neat and easily washable.

3. Occasion

Selection of clothes also changes according to occasion. For daily or informal wear durable dresses with simple designs can be chosen. But for occasional or formal wear novel fabrics with new styles are chosen.

Garments for daytime wear should be selected in daylight and those to be worn at night should be selected under artificial light. The difference between daylight and artificial light may make a considerable difference in the becomingness of a colour.

4. Fashion

Fashionable clothes look beautiful. Certain colours, styles, prints are in fashion during a particular period of time. If a person needs a fabric, fashion is also a main consideration. Children belonging to high income group wear fashionable clothes

to a great extent as compared to low income group. Sometimes neutral shades and abstract prints are in fashion. The length and width of the garment also varies from time to time. Extremes of fashion should be avoided.

5. Figure

Colour can appear to increase or decrease the size of an individual. Bright and light colours will emphasize the size. Black, dark blue, green, grey and brown tend to make a person look smaller. Large patterns and horizontal stripes and bands do not suit short figures. Soft, clinging material and vertical stripes helps to give the impression of height and slenderness. Unless one is tall, well proportioned and has a commanding personality, one should avoid all flashy and startling designs.

6. Health and Comfort

Health and Comfort are as important as aesthetic requirements in the choice of clothes. A well dressed person should always be in self consciousness state. If one is improperly or inappropriately dressed, one cannot easily ignore the feeling of discomfort. Clothing should not be disgracefully short nor unusually too long as to hang loose on the body or sweep the floor. One should aim at perfect fitting, gracefully accenting the lovely contours of the body.

While selecting material for clothing great attention should be given to its wearing qualities, such as strength and durability, fastness of colour and washing properties. The dyes used should not have any irritating or poisonous effect on the body.

7. Season

The season of the year influences the choice of colour. Warm colours such as red, orange, pink and yellow are usually preferred in winter. Cool colours such as white, blue, lavender and green are more refreshing during summer.

Some fibres are suitable for winter while others not, e.g. synthetics, silk and wool are suitable for winter as they are bad conductor of heat. Cotton and blends of cotton with synthetics are good for summer as they are good conductor of heat and are absorptive. They are comfortable in summer.

8. Income

Income of the family affects the selection of clothing. Children belonging to high income group can spend more percentage of money on clothing as compared to low income group. They can spend more money on fashionable garments rather than on durable clothes. Parents belonging to low income group prefer durable clothes rather than delicate ones. So the preferences of the clothing changes according to the income of the family. Low socio economic groups give more importance to durability, comfort and price as compared to becomingness and beauty etc.

QUESTIONS

1. What is the difference between filament and staple ? Give the classification of textile fibres.
2. Compare the properties of cotton and silk.
3. Write in detail the properties of wool.
4. List the natural fibres and give the characteristic of any one natural fibre.
5. What are textile fibres ?
6. Why wool is advised for winter use ?
7. Write short notes on
   (a) Structure of cotton/silk/wool/nylon.
   (b) Cotton keeps us cool, how ?
8. Define yarn.
9. Explain in detail the classification of yarn.
10. What is a simple yam. How do simple yarns are classified ?
11. Write the differences between ‘S’ and ‘T’ twists in yarns.
12. Elaborate the word t.p.i.
13. Study the fabrics constructed from complex yarns.
14. How do the different types of complex yarns influence the texture and service qualities of cloth ?
15. Explain the structure of a basic loom.
16. Name the three basic weaves. Explain anyone of them.
17. Write the differences between Satin and Sateen weaves.

18. Write in short :-
    (i) Selvedges
    (ii) Harness
    (iii) Battening
    (iv) Balance of a cloth
19. Compare the service qualities of various fabrics of the three Basic Weaves by observing some handloom products.
20. How does the knowledge of identification of textile fibre help in the day to day life in this present scientific world ?
21. Write about visual inspection.
22. Name the fibre which looks like a round rod like structure under the microscope.
23. What are the purposes of clothing ?
24. Collect the samples of silk and cotton fibre and note down the differences between the two fibres while performing the burning test.
25. Mention the various factors that should be considered in the selection of clothing.
26. How clothing needs are related to one's activity ?
27. Observe, record and present a comparative picture on the basis of durability, appearance and suitability of some fabrics available in the present market by collecting the samples.

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