PREFACE

In the curricular structure introduced by this University for students of Post-Graduate degree programme, the opportunity to pursue Post-Graduate course in Subject introduced by this University is equally available to all learners. Instead of being guided by any presumption about ability level, it would perhaps stand to reason if receptivity of a learner is judged in the course of the learning process. That would be entirely in keeping with the objectives of open education which does not believe in artificial differentiation.

Keeping this in view, study materials of the Post-Graduate level in different subjects are being prepared on the basis of a well laid-out syllabus. The course structure combines the best elements in the approved syllabi of Central and State Universities in respective subjects. It has been so designed as to be upgradable with the addition of new information as well as results of fresh thinking and analyses.

The accepted methodology of distance education has been followed in the preparation of these study materials. Co-operation in every form of experienced scholars is indispensable for a work of this kind. We, therefore, owe an enormous debt of gratitude to everyone whose tireless efforts went into the writing, editing and devising of proper lay-out of the meterials. Practically speaking, their role amounts to an involvement in invisible teaching. For, whoever makes use of these study materials would virtually derive the benefit of learning under their collective care without each being seen by the other.

The more a learner would seriously pursue these study materials the easier it will be for him or her to reach out to larger horizons of a subject. Care has also been taken to make the language lucid and presentation attractive so that they may be rated as quality self-learning materials. If anything remains still obscure or difficult to follow, arrangements are there to come to terms with them through the counselling sessions regularly available at the network of study centres set up by the University.

Needless to add, a great part of these efforts is still experimental–in fact, pioneering in certain areas. Naturally, there is every possibility of some lapse or deficiency here and there. However, these to admit of rectification and further improvement in due course. On the whole, therefore, these study materials are expected to evoke wider appreciation the more they receive serious attention of all concerned.

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Master of Social Work
[MSW]

Paper V

Human Growth & Behaviour

and Health & Hygiene

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Paper -MSW-6

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Master of Social Work
MSW : V & VI

PART A

PART B

PAPER - 6

Unit 1 □ Human Growth and Development : Concept and Principle of Development, Social and Cultural Environment

Structure

1.1 Introduction

Study of human development by the social workers has four basic goals-description, explanation, prediction and modification of human behaviour. Hence, scientific knowledge about human development enables the social workers to describe, explain, predict and to modify client's behaviour to help him to become a fully functional person.

1.2 Concept of Human Growth and Development

Elizabeth B. Hurlock (1997) defines human growth and development in the folowing manner -

"Many people use terms "growth" and "development" interchangeably. In reality they are different, though they are inseparable; neither takes place alone. Growth refers to *quantitative* changes - increases in size and structure. Not only does the child become larger physically, but the size and structure of the internal organs and the brain increase. As a result of the growth of the brain, the child has a greater capacity for learning, for remembering, and reasoning. The chlid grows mentally as well as physically.

Development by contrast refers to *qualitative* and quantitative changes. It may be defind as a progressive series of orderly, coherent changes. "Progressive" signifies that the changes are directional, that they lead forward rather than backward. "Orderly' and "coherent" suggest that there is a definite relationship between the changes taking places and those that preceded or will follow them. Neugarten has explained how changes in development affect people as they grow :

People change, whether for good or bad, as a result of the accumulation of experience. As events are resistered in the organisms, individuals invariably abstract from the traces of those experiences and they create more encompassing as well as more refined categories for the interpretation of new events. The mental filing system not only grows larger, but it is recognised over time, with infinitely more cross references ..... Adults are not only much more complex than children, but they are more different one from another and increasingly differently as they move from youth to extreme old age"

Leonie Sugarman (2001) has quoted 4 major definitions of development, they are as follows-

Thomas (1990) emphasizes the value - laden basis of concepts of development when he writes :

- People are developing normally (properly, desirably, satisfactorily, acceptably) when :
- they feel that they are fulfilling their own needs at least moderately well.
- their behaviour does not unduly encroach upon other peoplels rights and opportunities.
- they fulfil the responsibilities typically held as reasonable for people of their ability (physical and mental) and social environment, and
  the personal characteristics do not cause others to treat them in ways which harm them physically, psychologically, or socially or which deny them opportunities [equal to those of their peers of the same age, gender, and physical, intellectual, and/ or social behaviour] to persue their ambitions.

Chaplin (1988) focuses on the proces of development, rejecting the idea of directional movement toward an explict, coherent "end-state" :

We grow and change in more of a spiral than in a straight line. We go backwards as well as forwards. Perhaps we can only go forwards if we go backwards and regress into childlike feelings first. Growth is working with the rhythms, not proceeding from some depressing reality to a perfect harmonious self in the future.

Rogers (1980), in contemplating his own life, sees development as the personal expression that comes from learning, itself the outcome of risk taking :

Perhaps the major reason I am willing to take chances is that I have found that in doing so, whether I succeed or fail, I *learn.* Learning, especially learning from experience, has been a prime element in making my life worthwhile. Such

learning helps me to expand. So I continue take risks.

In an otherwise fairly abstract and technical discussion, Ford and Lerner (1992) use the metaphor of a sea journey to capture the adaptive nature of human development. Although maps and charts can help us on our travels, there is always the chance that we will meet the unexpected, the unforeseeable and unfamiliar. They see development as :

.....a continuous and sometimes unpredictable voyage throughout life, sailing from seas that have become familiar into oceans as yet uncharted toward destinations to be imagined, defined and redefined as the voyage proceeds, with occasional, often unpredictable transformations of one's vessel and sailing skills and the oceans upon which one sails resulting from unforeseen circumstances.

Sugarman also quoted regor's concept of the fully functional person (Kirschenbaum & Henderson, 1989; Rogers, 1961) summarized below - which serves to illustrate the notion of development as a process towards a theoretical ideal. It is somewhat misleading to talk of "the' fully functional person because Rogers does not see it as an achievable, "developed" state. Rather, development is denoted by the process of moving in the direction of becoming more fully functioning. It is a proces with some discernible, universal qualities : an increasing o openness to experience, increasingly existential living, and an increasing trust in one's organism.

1. *An increasing openness to experience :* To become more open to experience involves becoming less defensive-the polar opposite of openness. Defensivenes is where experiences are distorted in awareness or are denied awarene because they are perceived as threatening. In this way they are temporarily rendered harmless. Movement from the pole of defensiveness towards the pole of openness to experience allows people to become more able to listen to themselves and to experience what is going on within them. It is movement towards greater emotional self-awareness and acceptance. Feelings-be they positive or negative are experienced more fully.
2. *Increasingly existential living :* As a person becomes more open to experience he or she tends to live less in the past or the future and more in the present moment. This is what Rogers means by increasingly existential living. To live fully in the moment, "means an absence of rigidity, of tight organization of imposition of structure on experience. It means instead a maximum of adaptability, a discovery of structure in experience, a flowing, changing organization of self and personality". (Rogers, 1961, p. 189).

3. *An increasing trust in one's own organism :* Rather than depending on abstract principles, codes of action or previous experience for guidance, people who are open to their own experience and are living fully in the present are able to trust and be guided by their "total organismic reaction" to situations. They are confident that their own experience provides a sufficient and satisfactory basis for deciding how to respond to a particular situation.

After having an understanding of human growth and development it is now time to know the domains and dimensions of development of the self in which change and stability occure.

According to Papalia et al domains of development are as follows -

1. Physical development - growth of the body and brain, sensory capacities motor skills and health.
2. Cognitive development - change and stability in mental abilities, such as learning, attention, memory, language, thinking, reasoning, and creativity.
3. Psychosocial development - change and stability in emotions, personality and social relationships.

According to Rice (1995; in Sugarman 2001) dimensions of human development are -

- *Physical development :* Includes the physical growths of all components of the body and changes in motor development, the senses, and in bodily systems.
- *Cognitive development :* Includes all changes in the intellectual proceses of thinking, learning, remembering, judging, problem solving, and communicating.
- *Personal development :* Includes the development of the concept of self; the development of attachment, trust, security, love, and affection; and
- *Social development :* Includes the development of interpersonal relationships with family members, peers and other members of the community.

According to N.K. Schlossberg, E.B. Waters & J. Goodman (1995) - a person is experiencing change in 3 different areas of his/her life. They are -

1. Internally-includes autonomy, identity and making meaning
2. Close interpersonal relationships-includes intimacy, mattering and belonging
3. Relation to work or other areas of endeavour - includes the centrality of work in people's lives, career adaptability, self-efficacy and balance.

But we must remember that development is a unified process and not a bundle of isolated parts (Papalia et al) hence classifications are somewhat arbitrary in nature.

Now it is the time to have a look in the periods of development. They are as follows–

1. Prenatal Period - A time from conception to birth approximately a ninth month period.

2. Infancy - From birth to 18 or 24 months. Onset of language, symbolic thought, sensory motor coordination, and social learning among the children.

3. Early Childhood - From end of infancy to about 5or 6 years - regarded as the preschool years. Children started to become self sufficient; development of school readiness skills, and willingnes to play more with their peers.

4. Middle and Late Childhood - From 6 to 11 years that is regarded as the elementary school years. Children are learning the fundamental skills of reading, writing, and arithmetic and are getting an idea about the larger world and its culture.

5. Adolescence - Beginning generally at 10 to 12 years of age and ending at 18 to 21 years of age. Rapid physical changes in the human body in terms of gaining height and weight, and development of sexual characteristics.

6. Early Adulthood - From late teens or early twenties and last through the thirties. A time characterized by establishment of personal and economic independence, career development, and for many a time for selecting a life-partner.

7. Middle Adulthood - The period from 35 to 45 years of age and extends into the sixties that is marked by the expansion of personal and social involvement and family and social responsibility.

8. Late Adulthood - The period from sixties or seventies and lasts until death that is generally regarded as the time for adjustment, decreasing physical strenght and decaying health status, and retirement from economic activity.

1.3 Social and Cultural Environment

Universal processe of development, individual differences and influences on development along with its outcome always attracted the social worker's attention to know a person's need to grow normally, his or her reaction on many influences upon and within the person to explore a way to fulfil his/her fullest potential.

Humans are social animals as they grow and live in a socio-cultural milieu. But before we analyze the influence of socio-cultural factors we must first know the heredity and environment factors of development. According to Papalia et al "some influences on development originate primarily with **heredity :** the genetic endowment inherited from a person's biological parents at conception. Other influences come largely from the inner and outer **environment :** the world outside the self beginning in the womb and learning that comes experience".

Hence as a social worker one must consider the environmental factors like family, neighbourhood or community, socio-economic status and culture and ethnicity that affect human development in general.

Dr. Urie Bronfenbrenner, a famous psychologist, first developed an ecological model to explain how family, community, and cultural factors influence child's development. Bronfenbrenner put the child at the center office model and remarked that a child's development was influenced by gender, age, health and nutrition status, temperament, and other individual characteristics.

Bronfenbrenner's ecological model of devolopment is generally being used to provide explanation on how family, community and culture affect the growth and development of children who are growing up in many different cultures and setting in the world.In the Bronfenbrenners model there are four environmental systems that influence a child's development.

The first system ,the **immediate environment of a child** - includes family, school,peers and neighbourhood. Children's relationships and interactions with humans beings operating in this system have the most immediate effect on the devolopment. In India types of family viz. joint,extended and nuclear family have an impact on child development as regarded by many eminent scholars. Papalia et al. described many studies that relate socio economic status to developmental processes (such as mother's verbal interaction with their children) and to developmental outcomes (such as health and cognitive perfomance). It is generally not socio-economic status itself that affects these outcomes,they argued, but factors associated with socio-economic status such as the kinds of homes and neighbourhood people live in and quality of nutrition, medical care, supervision, schooling and other opportunities available to them.Poor children, they quoted, are more likely to have emotional or behavioral problems and their cognitive potential and school performance suffer even more. This system is also known as **Microsystem** – The settings with which the individual directly interacts.

The seconds systems involves **relationships and connections** between the various microsystems such as the link between the family and school. It is a fact that effective communication between parents and teachers about a child's experience and progress generally supports and enhances that child's growth and development. Conversely a child's development may hindered when expectation at home and school are different. This system is also known as **Meso-system** which gave details about the interactions if two micro-system such as opportunities within the family, such as access to book and emphasising basic academic and socialization skills, may influence the child`s experiences and success in another micro-system i.e. school.

Children's growth and development may also be affected by **indirect influences** their system-the social, political, religious, and other settings in which child is not personally involved but affect them through impacting on one of the Micro-systems or bear on those individuals or institutions who interact with the child. Changes in the third system may indirectly affect children's growth and development like government policies affecting schools or establishment of play grounds by the municipal authorities for the children or father's promotion in his office. This system is also known as **Exosystem** which denotes the concept that other contexts removed from the child's immediate environment have a powerful impact on a child's development.

The final system of the ecological model is **culture** in which a child is born and is being rearing. Every culture has specific childrearing practices-some behaviours are encouraged some are discouraged as they are undesirable. On the other hand, sense of self of children is in part rooted in their respective cultures. Child tends to develop in a fruitful way when the environment in which he or she is living acknowledges and pays respect his or her cultural beliefs and customs. Children, on the other hand, may not achieve their fullest potential when their cultures are not reflected in their experience beyond home. This system is also known as **Macro-system** which includes laws, customs of the culture, economic and political systems, religion, ethnic group, etc.

1.4 References

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1.5 Review Questions

1. what do you mean by human growth and development? What are the differences between growth and development?
2. What are the basic ideas behind the ecological model?

Unit : □ Growth and Development in Each Stages of Life Span-Conception to Old Age

Structure

2.1 Introduction

It is presumed that social workers may be able to get good understanding on why a human life has taken a certain path by studying human growth and development. Studying human growth and development helps us to have an idea about the human condition. It is the study of how human behaviour and capacities emerge and possibly change with age and it helps to identify the forces that can shape our lives (Catherwood, 2004).

2.2 Prenatal Development : From Conception to Birth

Fertilization or conception is a process which creats a single cell called a Zygote by combining sperm and ovum-the male and female sex cells. The male sex cells (commonly known as spermatozoa, plural of spermatozoon), are produced in the testicles (testes) and femle sex cells (ova, plural of ovum) are developed in the ovaries. A zygote contains 23 pairs of chromosomes, which have basic hereditary information, and each chromosomes has many genes through which genetic information passed on. Some 30,000 genes in human body individually or in combination formed specific characteristics of every human being.

When the ovum is in the Fallopian tube fertilization takes place. In the time of

sexsual intercourse spermatozoa are disposed off in the front of the uterus.These spermatozoa are drawn into the tube through strong harmonic attraction. Only one spermatozoon is allowed to enter the ovum and penetrate the wall of it. Then nuclei of two cells come close which lead to the breakdown in the membrane surrounding the each nucleus of the cells and that finally helps the two nuclei to be merged with one another.

According to Elizabeth B. Hurlock prenatal period has six important characteristics and she argued that each of them has a lasting effect on development during the later stages of the human life. They are as follows -

1. The hereditay endowment, which serves as the foundation for later development, is fixed, once and for all, at this time. It affects the human development in the later stages in two ways - first by placing limits beyond which the individual cannot go and second, because the hereditery endowment is entirely a matter of chance, it cannot be controlled.
2. Favourable conditions in the mother's body can foster the development of hereditery potentials while unfavourable conditions can stunt their development, even to the point of distorting the pattern of future development.
3. The sex of the newly created individual is fixed at the time of conception. The sex is important for three reasons : first from early life individuals are molded into approved cultural stereotype for their sex groups; second, they are denied learning exxperiences considered inappropriate for sex groups; and third, attitudes of significant people vary according to which sex group they belong to.
4. Proportionally greater growth and development take place during the prenatal period than at any other time throughout the individual's entire life.
5. The prenatal period is a time of many hazards, both physical and psychological.
6. The prenatal period is the time when significant people form attitudes toward newly created individuals. These attitudes will have a marked influence on the way these individuals are treated, especially during their early, formative years. If the attitudes are heavily emotionally weighted, they can often do play havoc with the mother's homoeostasis and, by so doing, upset the conditions in the mother's body that are essential to the normal development of the newly created individual.

The major milestone of this stage are listed below -

Up to 2 weeks (germinal period)	Up to 3-8 weeeks (embryonic period)	Up to 9-38 weeks (fetal period)
3 Days : Zygote increases to around 32 cells	Week 3-4 : nervous system and brain begin to grow from natural groove and tube/heart beats with basic blood supply/muscles, ribs, backbone, limb buds apprear/digestive system appears	3rd month : basic brain organization/ moves limbs, body and face/sexual
1 Week : Zygote increases to around 100-150 cells	Week 5-6 : head and brain grow rapidly/upper limbs grow and lower limbs appear	4th month : lower body growth/ stronger reflexes and movements
	Week 7-8 : stumps of fingers and toe appear/eyes open; all main body structures have begin to form	5th month : 100 billion nrurons in place in brain and connections to rest of body/fingernails and toenails/ more active/responds to sound and light/swims-kicks-turns/may show sleep-waking cycles
		6th month : eyes and lids fully formed/hair/some breathing movements/grasp reflex
		7th month : 'age of viability' at 22-26 weeks though still needs oxygen and temperature support
		8-9th month : rapid weight gain/ fatty tissues/increase in organ activity/antibodies from mother

Column one prepared from the writings of Feldman (2004) and rest columns adapted from Catherwood et al. (2004).

Feldman also discussed the environmental factors affecting prenatal development in the following way -

Factor	Possible Effect
Rubella (German measles)	Blindness, deafness, heart abnormalities, stillbirth
Syphilis	Mental retardation, physical deformities, maternal miscarriage
Addictive drugs	Low birth weight, addiction of infant to drug, with possible death, after birth, from withdrawal
Smoking	Premature birth, low birth weight and length

Alcohol	Mental retardation, lower-than-average birth weight small head, limb deforities
Radiation from X-rays	Physical deformities, mental retardation
Inadequate diet	Reduction in growth of brain, smaller-than-average weight and length at birth
Mother`s age younger than 18 at birth of child	Premature birth, increased incidence of Down syndrome
Mother`s age-older than 35 at birth of child	Increased incidence of Down syndrome
AIDS	Possible sprad of HIV to infant; facial deformities; growth failure

Pregnant women generally need 300-500 calories including some protein extra as malnutrition during pregnancy may have long term effects. But if a malnourished woman takes dietary supplements iron folic tablets there is a definite chance to have bigger, healthier, more active and more visually alert child.

2.3 Development during Neonatal Period

Neonatal period is the first two weeks of human life. The period in which the newborn is making adjustments with the postnatal environment is the shortest of all development stages. In this time newborn make four major adjustments, they are from 100 F in the mother's womb to 60-70 F in the delivery room.; begining of breathing followed by the cut of umbilical cord; sucking and swallowing of elimination of breast-milk instead of receiving nourishment through umbilical cord; and organs of elimination start to function.

The prenatal environment, lenght of gestation period, kind of birth (nrmal or othrwise), postnatal care, and parental attitude are mostly influencing the adjustments of the newborns to postnatal environment.

The newborns are physically weak and dependent on mother or other relatives; but they do have a repertoire of some identifiable and useful reflexive behaviour. Reflexes are defined as inherited responses to stimulation in specific parts of the newborn's body. According to Baron (2001) newborns show all the reflexes described below at birth very shortly thereafter -

Reflex	Description
Blinking	Baby closes eyes in response to light
Rooting	When cheek is touched or stroked, by turns toward touch; moves lips and tongue to suck

Sucking	When nipple or other object is placed in mouth, baby sucks
Tonic neck	When baby is placed on back with head turned to one side, baby stretches out arm and leg on side baby facing
Moro	Baby throws out arms and fans fingers, extends neck, and cries in response to loud noise or sudden drop of head
Babinski	When baby's foot is stroked from heel to toe, toes fan out
Grasping	When palms of hands are stroked, baby closes fingers around the object in a strong grasp
Stepping	Baby makes stepping motions if held upright so one foot just touches a surface

The sensory capacities of the newborn are well developed if we read the following points–

1 Hearing of newborn is fairly good and it generally improves within first 3 to 4 days after birth. Newborns normally respond better to the human voice than to the other sounds.

2. Newborns react differently to different smells and tastes

3. Newborns can see well up to 12 inches from their body. But colour vision is normally absent in them.

4. The skin of the newborn is quite sensitive to touch, pressure and temperature.

5. The feeling of hunger and thirst is fully developed at birth.

To avoid dreaded diseases like measles, whopping cough, polio, TB, diphtheria etc. immunization is a must for every child as vaccines mobilize the body's natural defense. Breast milk is the food for infants as it is more digestible and more nutritious than any food. It is also very helpful to prevent or minimize diseases like diarrhoea, respiratory infections, infection of the middle ear, and bacterial and urinary tract infections,. Angelsen et al., (2001) aptly remarked that the more often and longer babies are breast-fed, the better protected they are the better their cognitive performance.

2.4 Develpoment during Infancy

Infancy lasts from 2 weeks to 2 years of life. Hurlock proposes the following characteristics of infancy or babyhood -

1. Babyhood is the true foundation period of life because, at this time, many behaviour patterns, many attitudes, and many patterns of emotional expression are being established.

2. Babyhood is an age of rapid growth and change. Physical and psychological growth brings change in the capacities and intellectual development.
3. Babyhood is an age of decreasing dependency.
4. Babyhood is the age of increased individuality. Individuality is shown in appearance and in patterns of behaviours.
5. Babyhood is the beginning of socialization.
6. Babyhood is the beginning of sex-role typing.
7. Babyhood is an appealing age. Babies are appealing because of their big heads, protruding abdomens, small thin limbs, and tiny hands and feet. When they are dressed in baby clothes and wrapped in baby blankets, they become even more appealing.
8. Babyhood is the beginning of creativity.
9. Babyhood is a hazardous age. Among the physical hazards, illness and accidents are most serious because they often lead to permanent disabilities or to death. Since behaviour patterns interests and attitude are established during babyhood, serious psychological hazards can be result if poor foundations are laid at this time.

Physical development during infancy takes place the following manner -

Months	Growth and development
2 Months	Lift head and chest on arms, grasp any object Vision increases up to 12 beet
6Months	Roll over from back to front, sit with support start and to crawl Vision become normal (20/20)
12 Months	Walk alone and grasp any objects by using fingers and thumbs, sit alone
24 Months	Walks well

Zimbardo and Weber (1994) prepared the following table on norms for infant mental and motor development based on the Bayley Scales to show the average age at which rach behaviour is performed up-to 8 months. However they also reminded that individual differences in rate of development are considerable, but most infants follow this sequence.

Months	Norms
One month	Respond to sound Becomes quiet when picked up Follows a moving person with eyes Retains a large easily grasped object placed in hand Vocalizes occasionally

Two months	Smiles socially Engages in anticipatory excitement (to feeding, being held) Recognizes mother Inspects surroundings Bilnks to object or shadow (flinches) Lifts head and holds it erect and steadily
Three months	Vocalizes to the smiles and talk of an adult Searches for sound Makes anticipatory adjustments to lifting Reacts to disappearence of adults face Sits with support, head steady
Four months	Head follows dangling ring, vanishing spoon and ball moved across table Inspects and fingers of own hands Shows awareness of strange situations Picks up cube with palm grasp Sits with slight support
Five months	Discriminates strange from familiar persons Makes distinctive vocalizations (e.g. pleasure, eagerness, satisfaction) Makes effort to sit independently Turns from back to side Has partial use of thumb in grasp
Six Months	Reaches persistently, picks up cube deftly Trasnfer objects hand to hand Lifts cup and banga it Smiles at mirror image and likes frolicking Reaches unilaterally for small object
Seven months	Makes playful responses to mirror Retains two or three cubes offered Sits alone steadily and well Shows clear thumb opposition in grasp Scoops up pellet from table
Eight Months	Vocalizes four different syllables (such as da-da, me no) Listens selectively to familiar words Rings bell purposively Attempts to obtain three presented cubes Shows early stepping movements, pre-walking progression

Johnson and Blasco (1997) gave the following details of the psychological development during infancy

Age in Months	Emotional	Social	Adaptive
1-3	Interest Disgust Distress (pain, hunger) Enjoyment (social smile)	Understands relationships between voices and faces Bonding (parent-infant) Smile reciprocally Follows moving person with eyes	State regulation Requires only one night feeding
3-6	Anger Happiness Joy Pleasure Sadness Displeasure	Recognizes mother Attachment (infant-parent) Anticipates food on sight Smile spontaneously	
6-9	Personality unfolds Fear	Discriminates emotional facial expressions and reacts differently Preference for a given person Stranger anxiety Understands means-to-an-end relationship in social interactions (act-clap-repeat act)	Gums/swallows cracker Places hands on bottle Takes solids as well Finger feds dry cereal
9-12	Assertiveness Cautiousness	Differential fear response based on gender and age Concept of self Social interactions become intentional and goal-directed Separation anxiety	Holds bottle Holds, biles, chews cracker,/cookie Drinks from cup held for him or her
12-15	Shyness Empathy Sharing Self-comfort (e.g. attachment to blanket)	Solitary play Begins formation of relationships-love, friendship, acquaintance, strangers Offers ball to mirror image Kisses by simply touching lips to skin or licks	Cooperates with dressing Drinks from cup; some spillage Remove socks/hat
15-18	Shame/guilt Contempt	Self-conscious period; "coy" state Hugs parents	Uses spoon; some spillage

18-21	Associate feelings with symbols Begins to have thoughts feelings	First application of attributes to self (e.g. good, little, naughty) Initiates interactions by calling to adult Kisses with a pucker	Drinks from cup without spilling Moves about house without adult Emerging independence Removes a garment
21-24	Beginning "socialization" of emotional expression by social/cultural influences; modulation of emotion, masking of emotion Infants reaction to ambiguous events is shaped by emotional reactions of others	Imitates others please them Recursive nature of social thought (i.e. thinking about "How I behave to you and you to me") Parallel play Tolerates separation; will continue activity	Replaces some objects where they belong Uses spoon well Opens door by turning knob Removes clothes buttons Unzips zippers Puts shoes on part way

Infancy is full of hazards like emotional deprivation, too much affection, overprotectiveness, inconsistent training, child abuse, deterioration in family relationships failure to develop attachment behaviour, separation from mother etc. hence necessary steps should be taken to make the infancy/babyhood enjoyable for all.

2.5 Childhood Development

Childhood begins at the age of two years and extends to the age of thirteen years for the average girls and fourteen years for the average boys when they become sexually mature. The childhood period i.e. 2-12 years could be subdivided into two-early childhood which lasts from 2 years to 6 years and late childhood which extends from 6 years to 12 years or the time when a child becomes sexually mature.

Though the early childhood is a period of growth but not so rapid that was seen in the infancy and rate of growth is slowing down gradually. The period is marked by the improvement in the coordination of small and large muscle groups. This coordination leads to improved motor behaviours like hopping, skipping, throwing and many more. According to Corbin (1973) gross motor skills developed in the early childhood are the following :

Age	Gross Motor Skills
3 years	Cannot turn or stop suddenly or quickly Can jump a distance of 15 to 24 inches Can ascend a stairway unaided, alternating feet Can hop, using largely an irregular series of jumps with some variations added

4 years	Have more effective control of stopping, starting and turning Can jump a distance of 24 to 33 inches Can descend a long stairway alternating feet, if supported Can hop four to six steps on one foot
5 years	Can start, turn , and stop effectively in games Can make a running jump of 28 to 36 inches Can descend a long stairway unaided, alternating fee Can easily hop a distance of 16 feet

In this period child learns and acquires new skills by repetition, being adventurous, trying new things and by using already-known skills and knowlegde in acquiring new ones.

It is also the period when a child finally achieved the maturational capacity learn language, Lahey (2002) aptly quoted that 'Perhaps the most impressive developmental change during the preoperational stage is the growth in language. From a speaking vocabulary of 250 words at age 2, the child reaches a vocabulary of more than 14,000 words by age 6, learning a phenomenal average of almost 9 new words per day (Carey, 1977; Santrock, 1998)". According to Papalia et al;. (2004) cognitive advances during early childhood are the followings -

Advance	Significance
Use of symbols	Children do not need to be sensorimotor contact with an object, person, or event in order to think about it Children can imagine that objects or people have properties other than those they actually have
Understanding of identities	Children are aware that superficial alterations do not change the nature of things
Understanding of cause and effect	Children realize that events have causes
Ability to classify	Children organize objects, people, and events into meaningful categories
Understanding of number	Children can count and deal with quantities
Empathy	Children become more able to imagine how others might feel
Theory of mind	Children become more aware of mental activity and functioning of the mind

At this age group egocentric thinking declines and solitary play at the age of 2 replaced by parallel play which is followed by cooperative play at the last stage of the early childhood. Similar kind of change also happens in emotional outbursts-temper tantrums, which are directed to no one at the age of 2-3 years ; aggession which is

directed toward others at 4-7 years. In this period the boys and girls start to function in sex-stereotyped ways-like boys are playing with airplanes, cars etc. whereas girls are playing with dolls.

Late childhood extends from 6 years to sexually mature period i. e. 13 years for average girls and fourteen years for average boys. Health, nutrition, immunization sex and intelligence are affecting the physical growth of this period. The growth is relatively slow but even in this period. Cratty (1986) wrote the following to discuss the motor development in middle childhood.

Age	Selected behaviours
6.	Girls are superior in movement accuracy; boys are superior in forceful, less complex acts, Skipping is possible. Children can throw with proper weight shift and step
7.	One-footed balancing without looking becomes possible. Children can walk 2-inch-wide balance beams Children can hop and jump accurately into small squares Children can execute accurate jumping-jack exercise.
8.	Children have 12-pond pressure on grip strength Number of games participated in by both sexes is greatest at this age. Children can engage in alternate rhythmic hopping in a 2-2, 2-3or 3-3 patterns Girls can throw a small ball 40 feet
9.	Boys can run $16^{1/2}$ feet per second Boys can throw a small ball 70 feet
10.	Children can judge the intercept pathways of small balls thrown from a distance. Girls can run 17 feet per second
11.	Standing board jump of 5 feet is possible for boys; 6 inches less for girls

Following cognitive abilities are improved during this period.

Cognitive ability	Selected behaviours
Spatial thinking	Can use of map or model to find any object Can give direction for finding out anything Can find the way to destination Can measure the distance from one place from another Can estimate/calculate time needed to visit one place from another
Cause and effect	Can explore the cause and effect of any event
Classification	Can catagorize objects according to their shape,colour or both
Seriation and transitive inference	Can sort some sticks in shortest to longest order

Inductive and deductive reasoning	Can solve the inductive and deductive problems by using the knowledge which tells that inductive conclusion,which are based on particular premises are less certain and deductive conclusion which are based on general

In this period moral codes developed among children.These moral codes are influenced by the moral standards of the group with which they are identified, and a conscience which guides their behavior in places of external control needed when they are younger(Hurlock,1981).

In discussing emotional and social devolopment Lahey(2002)stated that "Children enter this period with close ties to their parents. Although these continues to be important, relationships wih peers become increasingly significant during this period. Before age 7, children have friendship, but they generally are not enduring and typically are not close. After 7, peer friendships become more important to children and tend to last longer.....Most friendships are with members of the same sex, and those cross-sex friendship that do exist are generally "just freinds". Although the terms *boyfreinds* and *girlfreind* are freely used , they have little meanings in the adult sense.

In this perod children are becoming more aware of their own and feelings of the persons they confronted. They are now also regulate their emotional expressions and outbursts in social situations. At this period they are also in a position to help others who are suffering emotional distress/problems.Their levels of understanding of conflicting emotions are gradually increasing as their age progresses. Harter(1996) noted the following about the conflicting emotions-

Approximate Age	Understanding of the children
3-6 years	Children do not understand that any two feelings can coexist. They cannot acknowledge feeling two similar emotions at once (such as mad and sad).
6-7 years	Children are developing separate categories for positive and negative emotions. They can be aware of two emotions at the same time. but it both are either positive or negative and are directed toward the same target
7-8 years	Children can recognize having two feelings of the same kind directed toward different target. However, they cannot acknowledge holding contradictory feelings.

8-10 years	children can integrate sets of positive and negative emotions. They can understand having contrary feelings at the same time. but only if they are directed toward different targets.
11 years	Children can describe conflicting feelings toward the same target.

The children should be allowed to eat when they are hungry and they should not be pressured to eat or drink everything given to them as this practice helps the children to regulate their own calorie intake. Care should be taken that children could get only about 30% of their total calories from fat and less than 10% from saturated fat to help them to avoid overweight and prevent cardiac problems in the future. The diet of the children should include meat, fish, egg, grains, fruits, vegetables and dairy products to provide protein, iron and calcium. For healthy growth of the children, they need on an average 2400 calories everyday-less for the younger children and more for older children. Improved dental care and having fluoride are also needed to avoid tooth decay in childhood years.

2.6 Development during Adolescence

Adolescence is a 7-8 years long transitional period between childhood and adulthood and is usually regarded to begin with puberty-the process that leads to sexual maturity or fertility-the ability to reproduce (Papalia et al. 2004). Many people think that the term 'adolescence' covers mental, emotional,social and physical maturity. Piaget, in this regard said "psychologically adolescence is the age when the individual becomes integrated inti society of adults, the age when the child no longer feels that he is bolow the level of his elders but equal at least in rights.....This integration into adult society has many affective aspects more or less linked with puberty....It also includes very profound intellectial changes.... This intellectual transformations typical of the adolescent's thinking enable him not only to acheive his integration into social relationships of adults, which is infact the most general characteristic of this period of development".

Hurlock (1981) proposed 8 important characteristics of adolescence which are as follows -

1. Adolescence period is very important because of its imegiate effects on attitudes and behaviours and other long term effects. Physical development is accompanied by the rapid mental development. These give rise to the need for mental adjustments and the necessity for establishing new attitudes, values and interests.

2. Adolescence is a transitional period. Children must "put away childish thing" and they must also learn new patterns of behaviour and attitudes to replace those they have abandoned.The adolescent, at this time, is neither a child nor an adult.If adolescent behave like children, they are told to "act their age". If they try to act like adults, they are often accused of being "too big for their britches"are reproved for their attempts to act like adults.
3. Adolescence is a period of change.The rate of change in attitudes and behavior during adolescence parallels the rate of physical change.There are 5 universal concomittants of the changes that occur during adolescence.The first is heightened emotionality,the intensity of which depends on the rate at which physical and psychological changes are taking place. Second, the rapid changes that accompany sexual maturing make young adolescents unsure of themselves, of their capacities and of their interests. Third changes in their bodies, their interest,and in the roles the social group expect them to play create new problems. Fourth, as interests and behavior pattern changes so do values. Fifth most adolescents are ambivalent about changes while they want and demand independence, they often dread responsibilities that go with independence and question their ability to cope with these responsibilities.
4. Adolescence is a problem age.Because of their inability to cope with problems alone as well as they believe they can, many adolescents find that solutions do not always come up to their expectation.
5. Adolescent is a time of search for identity. The identity the adolescent seeks to know who he is,what is his role in the society to be, is he a child or an adult.
6. Adolescent is a dreaded age. Acceptence of the cultural stereotypes pf teenagers as sloppy, unreliable individuals who are inclined towards destructiveness and antisocial behavior has led many adults who must guide and supervise the lives of many adolescents to dread this responsibilities and to be unsympathetic in their attitudes towards and treatment of normal adolescent behavior.
7. Adolescent is a time of unrealism. Adolescents have a tendency to look at life through rose tinted glasses. The more unrealistic their aspirations are the more angry, hurt and disappointed they will be when they feel that others have let them down or they not lived up to the goals they set for themselves.
8. Adolescence is the threshold of adulthood.

Physical development during adolescence include the following -

⇒ Rapid growth in height and weight. Boy and girls can gain an average of 4.1 inches and 3.5 inches in height respectively during a one year growth spurt. This spurt is seen two years before in girls than in boys. Height changes followed by the weight changes. Generally weight now rationally distributed over the areas of human body. Weight gain is the result of the increased muscle development in body fat in girls.

⇒ Development of secondary sex characteristics. Changes in the hormonal level lead to the following - 1. growth of public hair; 2. menarche (first menstrual period for girls) or growth of penis (for boys) 3. Change of voices in boys; 4. growth of hairs in the armpit; 5. growth of facial hair in boys; 6. increased productin of oil, increased sweat gland activity and the beginning of acne.

Papalia et al describe the usual sequence of physiological changes in adolescence -

Female characteristics	Age of first appearance
Growth of breasts	6-13
Growth of pubic hair	6-14
Body growth	9.5-14.5
Menarche	10-16.5
Underarm hair	About two years after appearance of pubic hair
Increased output of oil-and sweat-producing glands (which may lead to acne)	About the same time as appearance of underarm hair
Male characteristics	Age of first appearance
Growth of testes, scrotal sac	10-13.5
Growth of pubic hair	12-16
Body growth	10.5-16
Growth of penis, prostate gland, seminal vesicles	1-14.5
Change in voice	About the same time as the growth of penis
First ejaculation of semen	About one year after beginning of growth of penis
Facial and underarm hair	About two years after appearance of pubic hair
Increased output of oil-and sweat producing glands (which may lead to acne)	About the same time as appearance of underarm hair

According to Angela Huebner following (first 3 points) and psychological development takes place during adolescence -

Developing advanced reasoning skills. Advanced reasoning skills include the ability to think about multiple options and possibilities. It includes a more logical thought process and the ability to think about hypothetically. It involves asking and answering the question, "what if.....?"

Developing abstract thinking skills. Abstract thinking means thinking about things that cannot be seen, heard or touched. Examples include things like faith, trust, beliefs and spirituality.

Developing the ability to think about thinking in a process known as "metacognition". Meta-cognition allows individuals to think about how they feel and what they are thinking. It involves being able to think about how one is perceived by others. It can also be used to develop strategies for improving learning.

Establishing an identity. This has been called one of the most important tasks of adolescents. The question of "who am I" is not one that teens think about at a conscious level. Instead, over the course of the adolescent years, teens begin to integrate the opinions of influential others (e.g. parents, other caring adults, friends, etc.) into their own likes and dislikes. The eventual outcome is people who have a clear sense of their values and beliefs, occupational goals, and relationship expectations. People with secure identities know where they fit (or where they don't want to fit) in their world.

Establishing autonomy. Establishing autonomy during the teen years really means becoming an independent and self-governing person within relationships. Autonomous teens have gained the ability to make and follow through with their own decisions, live by their set of principles of right and wrong, and have become less emotionally dependent on parents. Autonomy is a necessary achievement if the teen is to become self-sufficient in society.

Establishing intimacy. Intimacy is usually first learned within the context of same-sex friendships, then utilized in romantic relationships. Intimacy refers to close relationships in which people are open, honest, caring and trusting. Friendships provide the first setting in which young people can practice their social skills with those who are their equals. It is with friends that teens learn how to begin, maintain, and terminate relationships, practice social skills, and become intimate.

Becoming comfortable with one's sexuality. The teen years mark the first time that young people are both physically mature enough to reproduce and cognitively advanced enough to think about it. Given this, the teen years are the prime time for the development of sexuality. How teens are educated about exposed to sexuality will largely determine whether or not they develop a healthy sexual identity.

Achievement. Because of cognitive advances, the teen years are a time when young people can begin to see the relationship between abilities and plans and their future vocational aspirations. They need to figure out what their achievement preferences are- what they are currently good at and areas in which they are willing to strive for success.

During adolescence teenagers are in need of more calories and other nutrients because of the growth spurt and incraesed physical activitiy. Food without nutritive value or not taking enough food affects the growth of the adolescents adversely, may impair their intellectual development and delays the sexual maturation. In this period there is greater need of food with proteins, carbohydrates, minerals, calcium, iodine, iron etc. to meet the demands of physical and intellectual growth, provide adequate reserves for illness/pregnancy and prevent adult onset of diseases related to nutrition e.g. hypertension and oesteoporesis (NACO,2000).

2.7 Development during Adulthood

Adulthood begins at the age of 20 and lasts 65 years. It is the longest development period in a human life. However, according to Hurlock the adulthood could be subdivided into 3 subgroups - Early Adulthood (extends from 18-40 years); Middle Adulthood (extends from 40-60 years) and Late Adulthood (extends from 60-death). She proposed following characteristics of every period -

Characteristics of early adulthood :

⇒ Early adulthood is the "setting down age". Now human beings come to the age where they have to asume responsibilities of adult life and have to settle down.

⇒ Early adulthood is the "reproductive age"

⇒ Early adulthood is "problem age". The early adult years present new problems, different in their major aspects, from problems experienced in the earlier years of life.

⇒ Early adulthood is a period of emotional tension. When people are trying to get the lay of a new land in which they find themselves, they are likely to be emotionally upset. However by the early or mid-thirties, most young adults have solved their problems, well enough to become emotionally stable and calm.

⇒ Early adulthood is a period of social isolation. With the end of formal education and the entrance into the adult life pattern of work and marriage, associations with the peer groups of adolescence wane and, with them, opportunities for social contacts outside the home, As a result, for the first time since babyhood even most popular individual is likely to experience social isolation.

⇒ Early adulthood is a time of commitments

⇒ Early adulthood is often a period of dependency. Early adults sometimes depend on their parents, educational institutions, bank or governments for giving scholarships, loans and opportunities to set up economic enterprise.

⇒ Early adulthood is a time of value change.

⇒ Early adulthood is a time of adjustments to new lifestyles.

⇒ Early adulthood is a creative age.

Characteristics of middle adulthood :

⇒ Middle age is a dreaded period. It is characterized that, next to old age, it is the most dreaded period in the total life span and one adults will not admit that they have reached until the calender and the mirror force them to do so.

⇒ Middle age is a time of transition. It is the time when men and women leave behind the physical and behavioural characteristics of adulthood and enter a period of life when new physical and behavioural characteristics will prevail. It has been said that this is the time when men undergo a change in virility and women a change in fertility.

⇒ Middle age is a time of stress. This period brings stress as in this time a number of adjustments must be made in home,business and social aspects of life.

⇒ Middle age is a "dangerous age". The usual way of interpreting "dangerous" is in terms of male who wants to have a last fling in life, especially in his sex life, before old age catches up with him. In addition, it is the time when individuals break down physically as a result of overwork, over-worry, or careless living. The incidence of mental illness rises rapidly in middle age among both men and women, and it is also a peak age for suicides.

⇒ Middle age is an "awkward age" as middle-aged persons are no longer "young" nor they yet "old".

⇒ Middle age is a time of achievement. It should be a time not only for financial and social success but also for authority and prestige.

⇒ Middle age is a time of evaluation. It is the time of self-evaluation of the accomplishments in the light of the earlier aspirations and the expectations of others, especially family members and friends.

⇒ Middle age is a time of boredom.

Characteristics of old age :

⇒ Old age is period of decline

⇒ There are individual differences in the effects of ageing

⇒ The elderly have a minority group status

⇒ Ageing requires role changes

⇒ Poor adjustment is characteristics of old age

⇒ The desire for rejuvenetion is widespread in old age.

Life-span researcher Daniel Levinson (1978, 1986) proposes chronological period in adulthood that correspond to critical transitions in life structures.

Levinson's Stages of Adulthood	
Ages 17 to 22	Early Adult Transition Leave adolescence, make preliminary choice for adult life
Ages 22 to 28	Entering the Adult World Initial choicesin love, occupation, friendship, values, life-styles
Ages 28 to 33	Age 30 Transition Change in life structure. Either a moderate change or, more often a severe and stressful crisis
Ages t33 to 40	Setting Down Establish a niche in society, progress on a timetable, in both family and career accomplishments
Ages 40 to 45	Mid-life transition Life structure comes into question. Usually a time of crisis in the meaning, direction and value of each person's life. Neglected parts of the self (talents, desires, aspirations) seek expression.
Ages 45 to 50	Entering Middle Adulthood Choices must be made and a few life structure formed. Person must commit to new tasks
Ages 50 to 55	Age 50 Transition Further questioning and modification of the life structure. Men did not have a crisis at age 40 are likely to have now.
Ages 55 to 60	Culmination of Middle Adulthood Build a new life structure. Can be time of great fulfilment.
Ages 60 to 65	Late Adulthood Transition Reappraisal of life. Moments of pride in achievement are interspersed with periods of despair
Ages 65 to 80	Late Adulthood Make peace with oneself and other. Fewer illusions, broader perspective on life
Age 80 plus	Late Late Adulthood Final transition. Prepare for death.

Adapted from Zimbardo and Weber (1994).

It is a fact that some cognitive abilities improve, some remain same and some decline during adulthood period. Components of crystallized intelligence (like knowledge about facts and figures, inner meanings of words, poems etc.) are slightly but steadily improving during 20-70 years of age group. Generally no declines noticed in the fundamental aspects of intelligence during 20-70 years of age group. People of the same age group have unchanged capacity to reason about everyday problems; understands mathematical concepts and equations and to learn and remember required information. On the other hand there is a small increase in problem solving capacity in a more meaningful way during the adulthood. However, the fluid intelligence and short-term memory declines in this period. Capacity of abstract problem solving, divergent thinking, doing cognitive tasks that must be done immediately is gradually declining. That's why psychologists are saying that the cognitive performance of the young adult is much faster than the older adults.

Schaie (1977-78; Schaie and Willis, 2000) proposed a life-span model of cognitive development which has seven stages revolve around objectives that come to the fore at various stages of life. These objectives shift from acquisition of information and skills (what I need to know) to practical integration of knowledge and skills (how to use what I know) to a search for meaning and purpose (why I should know). The seven stages are as follows :

1.	Acquisitive stage (childhood and adolescence)	Children and adolescents acquire information and skills mainly for their own sake or as preparation for participation in society
2.	Achieving stage (late teens or early twenties to early thirties)	Young adults no longer acquire knowledge merely for its own sake; they use what they know to pursue goals, such as career and family.
3.	Responsible stage (late thirties to early sixties)	Middle-aged people use their minds to solve practical problems associated with responsibilities to others, such as family members of employees
4.	Executive stage (thirties or forties through middle age)	People in the executive stage, which may overlap with the achieving and responsible stages, are responsible for social system (such as govermental or business organizations) or social movements. They deal with complex relationship on multiple levels.
5.	Recognizational stage (end middle age, beginning of late adulthood)	People who enter retirement recognize their lives and intellectual energies around meaningful pursuits that take the place of paid work.

6.	Reintegrative stage (late adulthood)	Older adults, who may have let go of some social involvement and whose cognitive funtioning may be limited by biological changes, are often more selective about what tasks they expend effort on. They focus on the purpose of what they do and concentrate on tasks that have the most meaning for them.
7.	Legacy-creating stage (advanced old age)	Near the end of life, once reintegration has been completed (or along with it), older people may create instructions for deposition of prized possessions, make funeral arrangements, provide oral histories or write their life stories as a legacy for their loved ones. All of these tasks involves the exercise of cognitive competencies within a social and emotional context.

Source : Papalia et al. (2004)

Many psychologists think that major dimensions of adult personality are very stable. In one hand people in the adulthood generally become less emotional, less anxious, less creative, less socially outgoing and in the other hand they are more dependable considerable and agreeable. They are now in a position to accept the hardship of life. Gender differences are also very much noticeable as women have become more assertive confident and independent whereas men have become more aware about the aesthetic and affection needs. Lahey remarked that the key dimensions of personalities change with increasing age, often in ways that make life more enjoyable, but people tend to stay in their same positions on each trait relative to other people.

2.8 References

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2.9 Review question

1. What are the three stages of prenatal development? Give details of the each stage.
2 Write a short note on reflexes and sensory capacities during neonatal period.
3 What are the characteristics of each development stage?
4 Write a short note on growth and development during any one stage of life.

Unit 3 □ Principle of Growth and Development : Basic Human Needs from Infancy through adulthood

Structure

3.1 Introduction

Knowledge about human development generally helps the social workers to help the children and youths with problems or to those who are at risks to grow and to develop to their fullest capacity and to live a fruitful life and participate fully in the activities targeted towards national development. This unit will help the students to understand typical growth and development patterns in the organisms.

3.2 Principles

According to Paul B. Baltes (in Sugarman, 2001) there are 7 tenets or key principles of life-span development approach. These principles are regarded as the conceptual frame-work for the study of human development.

Development is

- *A lifelong process.* Development is not restricted to childhood.Both quantitative and qualitative development can occur at all stages of life course.
- *Multidirectional and multidimensional.* Development occurs at a number of different domains,at different rates and in a number of directions.
- A process that shows *plasticity.* An individual developmental course can, atleast to some degree,be modified through life conditions and experiences.
- A process involving *both gains and losses.* As well as involving growth and gain, development also involves coming to terms with decline and loss.
- An *interactive process.* Development is the outcome of the interaction between individual and environment, both of which can influence its course.

- *Culturally and historically embedded.* Developmental rates and courses vary across different cultures and historical periods.
- A *multidisciplinary feild of study.* Life span development is not concerned merely with psychological factors. Biological, sociological, anthropological and environmental factors can all interact with and influence individual development.

However according to Papalia et al.(2004) there are six key principles of human development that are identified by Paul B. Baltes and his colleagues. They are as follows as stated by Papalia, Olds and Feldman-

1. *Development is lifelong:* Development is a lifelong process of change in the ability to adapt to the situation one selects, or in which one finds oneself. Each period of lifespan is affected by what happened before and will affect what is to come. Each period has its own unique characteristics and value, none is more or less important than any other. Although it was once widely believed that development stops at adolescence. we now know very old people can grow. The experience of dying can be a final attempt to come to terms with one's life in short, to develop.
2. *Development involves both gains and losses.* Development is multidimensional and multidirectional. It occurs along multiple interacting dimensions biological, psychological and social each of which may develop at a varying rate. Development also proceeds in more than one direction. As people gain in one area , they may loose in other and at the same time. Children grow mostly in one direction up both in size and in abilities. Then the balance gradually shifts. Adolescents typically gain physical abilities but lose there facility in learning languages. Some abilities like vocabulary, typically continue to increase throughout most of adulthood; others, such as ability to solve unfamiliar problems, may diminish; and some new attributes, such as expertise may develop in midlife. People seek to maximize gains and to minimize losses by learning to manage or to compensate for them.
3. *Relative influences of biology and culture shift over life span.* The process of development is influenced by both biology and culture, and balance between these influences changes over time. Biological influences, such as sensory acuity and muscular strength and coordination as a person gets older, but cultural supports such as education, relationships, and technologically age-freindly environments may help to compensate.
4. *Development involves a changing allocation of resources.* Nobody can do everything. Individuals choose to "invest" their resources of time, energy, talent, money and social support in varying ways . Resources may be used for

growth (for example,learning to play instrument or improving one's skill),maintenance or recovery(practicing to maintain or regain proficiency),and dealing with loss when maintenance and recovery are not possible. The allocation of resources to these functions changes throughout the life as the total available pool of resources decreases.In childhood and young adulthood, the bulk of resources typically goes to growth;in old age, to regulation of loss.In midlife,the allocation is more evenly balanced among the three functions.

5. *Development is modifiable.* Throughout life, development shows plasticity. May abilities, such as memory, strength, and endurance, can be significantly improved with training and prractice, even late in life. However,.....even in children the potential for change has limits. One of the tasks of developmental research is to discover to what extent particular kinds of development can be modified at varous ages.
6. *Development is influenced by the historical and cultural context.* Each person develops within multiple contexts - circumstances or conditions defined in part by biology, in part by time and place. In addition to age-graded and nonnormative influences, human beings (....) influence, and are influenced by, their historical - cultural context ..... developmental scientists have significant cohort differences in intellectual functioning, in women's midlife emotional development, and in the flexibility of personality in old age.

According to Novella J. Ruffin, Assistant Professor, Virginia State University there is a set of principles that characterizes the pattern and proces of growth and development, they are as follows -

1. **Development proceeds from the head downward.** This is called the **cephalocaudle principle.** This principle describes the direction of the growth and development. According to this principle, the child gains control of the head first, then the arms, and then the legs. Infants develop control of the head and face movements within the first two months after birth. In the next few months, they are able to lift themselves up by using their arms. By 6 to 12 months of age, infants start to gain leg control and may be able to crawl, stand, or walk. Coordination of arms always precedes coordination of legs.
2. **Development proceeds from the center of the body outward.** This is the principle of **proximodistal development** that also describes the direction of development. This means that the spinal cord develops before outer parts of the body. The child's arms develop before the hands and the feet develop before the fingers and toes. Finger and toe muscles (used in fine motor dexterity) are the last to develop in physical development.

3. **Development depends on maturation and learning. Maturation** refers to thr sequential characteristic of biological growth and development. The biological changes occur in sequential order and give children new abilities. Changes in the brain and nervous system account largely for maturation. These changes in the brain and nervous system help children to improve in thinking (cognitive) and motor (physical) skills. Also, children must mature to a certain point before they can progress to new skills **(Readiness).** For example, a four-month-old cannot use language because the infant's brain has not matured enough to allow the child to talk. By two years old, the brain has developed further and with help from others, the child will have the capacity to say and understand words. Also, a child can't write or draw until he has developed the motor control to hold a pencil or crayon. Muturational patterns are innate, that is, genetically programmed. The child's environment and the learning that occurs as a result of the child's experiences largely determine whether the child will reach optimal development. A stimulating environment and varied experiences allow a child to develop to his or her potential.
4. **Development proceeds from the simple (concrete) to the more complex.** Children use their cognitive and language skills to reason and solve problems. For example, learning relationships between things (how things are similar), or classification, is an important ability in cognitive development. The cognitive process of learning how an apple and orange are alike begins with the most simplistic or concrete thought of describing the two. Seeing no relationship, a preschool child will describe the objects according to some property of the object, such as colour. Such a response would be, "An apple is red (or green) and an orange is orange." The first level of thinking about how objects are alike is to give a description or functional relationship (both concrete thoughts) between the two objects. "An apple and orange are round" and "An apple and orange are alike because you eat them" are typical responses of three, four and five year olds. As children develop further in cognitive skills, they are able to understand a higher and more complex relationship between objects and things; that is, that an apple and orange exist in a class called fruit. The child cognitively is then capable of classification.
5. **Growth and development is a continuous process.** As a child develops, he or she adds to the skills already acquired and the new become the basis for further achievement and mastery of skills. Most children follow a similar pattern. Also, one stage of develoment lays the foundation for the next stage of development. For example, in motor development, there is a predictable sequence of developments that occur before walking. The infant lifts and turn

the head before he or she can turn over. Infants can move their limbs (arms and legs) before grasping an object. Mastery of climbing stairs involves increasing skills from holding on to walking alone. By the age of four, most children can walk up and down stairs with alternating feet. As in maturation, in order for children to write or draw, they must have development the manual (hand) control to hold a pencil and crayon.

6. **Growth and development proceed from the general to specific.** In motor development, the infant will be able to grasp an object with the whole hand before using only the thumb and forefinger. The infant's first motor movements are very generalized, undirected, and reflexive, waving arms or kicking before being able to reach or creep toward an object. Growth occurs from large muscle movements to more refined (smaller) muscle movements.
7. **There are individual rates of growth and develoment.** Each child is different and the rates at which individual children grow are different. Although the patterns and sequences for growth and development are usually the same for all children, the rates at which individual children reach developmental stages will be different. Understanding this fact of individual differences in rates of development should cause us to be careful about using and relying on age and stage characteristics to describe or label children. There is a range of ages for any developmental task to take place. This dismisses the notion of the "average child". Some children will walk at ten months while other walks a few months older at eighteen months of age.Some children are more active while others are more passive. This does not mean that the passive child will be less intelligent as an adult. There is no validity to comparing one child's progress with or against another child. Rates of development also are not uniform within an individual chlild. For example, a child's intellectual development may progress faster than his emotional or social development.

According to Elizabeth B. Hurlock there are ten principle of development and they are as follows -

The first principle of development is that development involves changes, the goal of which is self-realization or the achievement of hereditary potentials.

Children's attitudes toward change are influenced by their awareness of these changes, how they affect children's behaviour, social attitudes toward these changes, how they affect children's appearance, and how the social group reacts to children when these changes occur.

The second principle of development is that early development is more critical than later development. Because early foundations are greatly influenced by learning

and experience. If they are harmful to a child's personal and social adjustments, they can be changed before they settle into habitual patterns.

The third principle of development emphasizes the fact that development comes from the interaction of maturation and learning, with maturation setting limits to the development.

The fourth principle of development is that the pattern of development is predictable, though this predictable pattern can be delayed or accelerated by conditions within the parental environments.

The fifth principle of development is that the developmental pattern has certain predictable characteristics, the most important of which are that there is similarity in the developmental pattern for all children; development proceeds from general to specific responses; development was continuous; different areas develop at different rates; and there is corelation in development.

The sixth principle of development is that there are individual differences in developmet due partly to hereditary influences and party to environmental conditions. This is true for both physical and psychological development.

The practical significance of knowing that there are individual differences in development is that it emphasizes the importantance of training children according to their individual needs and of not expecting the same behaviour in all children.

The seventh principle of development is that there are periods in the developmental pattern which are labeled are prenatal period, infancy, babyhood, early childhood, late chidhood and puberty. Within these periods there are times of equilibrium are disequilibrium and behaviour patterns that are normal and those that are carry-overs from an earlier period-usually called "problem" behaviour.

The eighth principle of development is that there are social expectations for every developmental period. These social expectations are in the form of developmental tasks which enable parents and teachers to know at what ages children are capable of mastering the different patterns of behaviour necessary to make good adjustments.

The ninth principle of development is that every area of development has potential hazards-physical and psychological-which may alter the pattern of development. The tenth principle of development is that happiness varies at different periods in the developmental pattern. The first year of life is usually the happiest and puberty is usually the most unhappy.

3.4 Basic Human Needs

Over the years, several theories about development have evolved to explain basic

human needs in different stages of development. We will discuss four major theories here.

Psychosexual development theory :

This theory was developed by Sigmund Freud in the late 19th and early 20th century. In the development of his theories, Freud's main concern was with sexual desire, defined in terms of formative drives, instincts and appetites that naturally determined one's behaviours and belifes, even as those behaviours and beliefs are continually repressed (Wikipedia). Freud also believed that human beings develop through stages based upon a particular erogenous zone.

David B. Stevenson (1996) gave the following details about the various stages of human development as proposed by psychosocial development theory of Freud.

The Oral Stage

The oral stage begins at birth, when the oral cavity is the primary focus of libidal energy. The child, of course, preoccupies himself with nursing, with the pleasure of sucking and accepting things into the mouth. The **oral character** who is frustrated at this stage., whose mother refuse to nurse him on demand or who truncated nursing sessions early, is characterized by pessimism, envy, suspicion and sarcasm. The overindulged oral character, whose nursing urges were always and often excessively satisfied, is optimistic, gullible and is full of admiration for others aruond him. The stage culminates in the primary conflict of weaning, which both deprives the child of the sensory pleasures of nursing and of the psychological pleasure of being cared for, mothered, and held. The stage lasts approximately one and one-half years.

The Anal Stage

At one and one-half years, the child enters the anal stage. With the advent of toilet training comes the child's obsession with the erogenous zone of the anus and with the retention or expulsion of the feces. This represents a classic conflict between the id, which derives pleasure from expulsion of bodily wastes, and the ego and superego, which represent the practical and social pressures to control the bodily functions. The child meets the conflict between the parent's demands and the child's desires and physical capabilities in one of two ways; Either he puts up a fight or he simply refuses to go. The child who wants to fight takes pleasure in excreting maliciously, perhaps just before or just after being placed on the toilet. If the parents are too lenient and the child manages to derive pleasure and success from his expulsion, it will result in the formation of an **anal expulsive character.** This character is generally messy, disorganized, reckless, careless and defiant. Conversely, a child may opt to retain feces, thereby spiting his parents while enjoying the pleasurable presssue of the built-up feces on his intestine. If this tactic succeeds and the child is overindulged, he will

develop into an **anal retentive character**. This character is neat, precise, orderly, careful, stingy, withholding, obstinate, meticulous and passive-aggressive. The resolution of the anal stage, proper toilet training, permanently affects the individual propencities to possession and attitude towards authority. This stage lasts from one-half to two years.

The Phallic Stage

The phallic stage is the setting for the greatest, most crucial sexual conflict in Freud's model of development. In this stage, the child's erogenous zone is the genital region. As the child becomes more interested in his genitals, and in the genitals of others, conflict arises. The conflict, labeled the **Oedipus complex** (The **Electra complex** in women), involves the child's unconscious desire to possess the opposite-sexed parent to eliminate the same-sexed one.

In the young male, the oedipus conflict stems from his natural love for his mother, a love which becomes sexual as his libidal energy transfers from the anal region to his genitals. Unfortunately for the boy, his father stands in the way of his love. The boy therefore feels aggression and envy towards the rival, his father and also feels fear that the father will strike back at him. As the boy has noticed that women, his mother in particular, have no penises, he is struck bya great fear that his father will remove his penis, too. The anxiety is aggravated by the threats and discipline he incurs when caught masturbating by his parents. This **castration anxiety** outstrips his desire for his mother, so he represses the desire. Moreover, although the boy sees that though he cannot posses his mother, because his father does, he can posses her vicariously by identifying with his father and becoming as much like him as possible: this identification indoctrinates the boy into his appropriate sexual role in life. A lasting trace of the Oedipus conflict is the superego, the voice of the father within the boy. By this resolving his incestuous conundrum, the boy passes into the **latency period,** a period of libidal dormancy.

On the Electra complex, Freud was more vague. The complex has its roots in the little girl's discovery that she, along with her mother and all other women, lack the penis which her father and other men posses. Her love for her father then becomes both erotic and envious, as she yearns for a penis of her own. She comes to blame her mother for her perceived castration, and is struck by **penis envy,** the apparent counterpart to the boy's castration anxiety. The Resolution of the Electra complex is far less clear-cut than the resolution of the Oedipus complexes in males; Freud stated that the resolution comes much later and is never truly complete. Just as the boy learned his sexual role by identifying with his father, so the girl learns her role by identifying with her mother in an attempt to posses her father vicariously. At the

eventual resolution of the conflict, the girl passes into the latency period, though Freud implies that she always remains slightly fixated at the phallic stage.

Fixation at the phallic stage develops a **phallic character,** who is reckless, resolute, self-assured,and nurcissistic-excessively vain and proud. The failure to resolve the conflict can also cause a person to be afraid or incapable of close love; as well, Freud postulated that fixation could be a root cause of homosexuality.

Latency Period

The resolution of the phallic stage leads to the latency period, which is not a psycho-sexual stage of development, but a period in which the sexual drive lies dormant. Freud saw latency as a period of unparalleled repression of sexual desires and erogenous impulses. During the latency period, children pour this repressed libidal energy into sexual persuits such as school, athletics and same sex friendships. But soon puberty strikes, and the genitals once again become a central focus of libidal energy.

The Genital Stage

In the genital stage, as a child's energy once again focuses on his genitals, interest turns to heterosexual relationships. The less energy the child has left invested in unresolved psychological developments, the greater his capacity will be to develop normal relationships with his opposite sex. If, however, he remains fixated, particularly on the phallic stage, his development will be troubled as he struggles with further repression and defences.

Jean Piaget's theory of Development

According to Piaget there are four stages of development in the thought processes of human beings. These stages were the sensory-motor period, the preoperational period, the concrete operational period and the formal operational period.

Pam Silverthorn (1999) gave the following details of Piaget's theory of development.

The Sensory Motor Period (birth to 2 years)

During the sensory motor stage, infants are toddlers "think" with their eyes, ears, hands and other sensory motor equipment (http://raven.cc.ukans.edu/-kupsych/dennisk/Cog_Inf.htm). Piaget said that a child's cognitive system is limited to motor reflexes at birth, but the child builds on these reflexes to develop more sophisticated procedures. They learn to generalize their activities to a wider range of situations and coordinate them into increasingly lengthy chains of behaviour.

Preoperational Thought (2 to 6/7 years)

At this age according to Piaget children acquire representational skills in the area of mental imagery, and especially language. They are very self-oriented, and have an

egocentric view, that is preoperational children can use these representational skills only to view the world from their own perspective.

Concrete Operations (6/7 to 11/12 years)

As opposed to preoperational children, children in the concrete operational stage are able to take into account another person's point of view and consider more than one perspective simultaneously, with their thought process being more logical, flexible, and organized than in early chilhood. They can also represent transformations as well as static situations. Although they can understand concrete problems, Piaget would argue that they cannot yet contemplate or solve abstract problems and that they are not yet able to consider all the logically possible outcomes. Children at this stage would have the ability to pass conservations (numerical) classification, seriation and spatial reasoning tasks.

Formal Operations (11/12 to adult)

Persons to reach the formal operation stage are capable of thinking logically and abstractly. They can also reason theoretically. Piaget considered this the ultimate stage of development, and stated that although the children would still have to revise their knowledge base, their way of thinking was as powerful as it would get.

Kohlberg's Stages of Moral Development Theory

These theory was developed by Lawrence Kohlberg to explain the development of moral reasoning in the human being. It is the basis for ethical behaviour and has development stages.

From http://www.awa.com/w2/erotic_computing/kohlberg.stages.html we have found the following details of this theory -

Kolberg's theory specifies six stages of moral development, arranged in three levels.

Level I : Preconventional / Premoral

Moral values reside in external, quasi-physical events, or in bad acts. The child is responsive to rules and evaluative labels, but views them in terms of pleasant or unpleasant consequences of actions, or in terms of the physical power of those who impose the rules.

Satge 1 : Obedience and punishment orientation

- Egocentric difference to superior power or prestige, or a trouble avoiding set.
- Objective responsibility.

Stage 2 : Naively egoistic orientation

- Right action is that which is instrumental in satisfying the self's needs and occasionally others'

- Relativism of values of each actor's needs and perspectives.
- Naive egalitarianism, orientation to exchange and reciprocity.

Level II : Conventional / Conformity

Moral values reside in performing the right role, in maintaining the conventional order and expectancies of others as a value in its own right.

Stage 3 : Good-boy/good-girl orientation

- Orientation to approval, to pleasing and helping others.
- Conformity to stereotypical images of majority or natural role behaviour.
- Action is evaluated in terms of intentions.

Stage 4 : Authority and social-order-maintaining orientation

- Orientation to "doing duty" and to showing respect for authority and maintaining the given
- social order or its own sake.
- Regard for earned expectations of others.
  Differentiates actions out of a sense of obligation to rules from actions for generally "nice" or natural motives.

Level III : Postconventional / Self-Accepted Moral Principles

Morality is defined in terms of conformity to shared standards, right or duties apart from supporting authority. The standards confirmed to are internal, and action-decisions are based on an inner process of thought and judgement concerning right and wrong.

Stage 5 : Contractual/legalistic orientation

- Norms of right and wrong are defined in terms of laws or institutionalized rules which seem to have a rational basis
- When conflict arises between individual needs and law or contract, though sympathetic to the former, the individual believes the latter must prevail because of its greater functional rationality for society, the majority will and welfare.

Stage 6 : The morality of individual principles of conscience

- Orientation not only toward existing social rules, but also toward the conscience as a directing agent, mutual trust and respect, and principles of moral choice involving logical universalities and consistency.
- Action is controlled by internalized ideals that exert a pressure to act accordingly regardless of the reactions of others in the immediate environment.
- If one acts otherwise, self-condemnation and guilt result.

Psychosoical Theory of Erickson

Erickson's theory of psychosocial development is one of the best-known theories of personality. Similar to Freud, Erickson believed that personality develops in a series of stages. Unlike Freud's theory of psychological stages. Erickson's theory describes the impact of social experience across the whole life-span (Kendra Van Wagner). This theory describes eight developmental stages through which a healthily developing human should pass from infancy to late adulthood.

Doug Davis and Alan Clifton (1995) gave the following details of each development stages as stated by Erickson -

Stage 1 - Basic Trust vs. Mistrust

- Developing trust is the first task of the ego, and it is never complete.
- The child will late mother out of sight without anxiety and range because she has become an inner certainty as well as outer predictability.
- The balance of trust with mistrust depends largely on the quality of maternal relationship.

Stage 2 - Autonomy vs. Shame and Doubt

- If defined autonomy, the child will turn against him/herself urges to manipulate and discriminate.
- Shame develops with the child's self-consciousness.
- Doubt has to do with having a front and back - a "behing" subject its own rules. Left over doubt may become paranoia.
- The sense of autonomy fostered in the child and modified as life proggresses serves the preservation in economic and political life of a sense of justice.

Stage 3 - Initiative vs. Guilt

- Initiative adds to autonomy the quality of undertaking, planning, and attacking a task for the sake of being active and on the move.
- The child feels guilt over the goals contemplated and the acts initiated in exuberant enjoyment of new locomotor and mental powers.
- The castration complex occuring in this stage is due to the child's erotic fantacies.
- A residual conflict over initiative may be expressed as hysterical denial, which may cause the repression of the wish or the abrogation of the child's ego: paralysis and inhibition, or over compensation and showing off.
- The Oedipal stage results not only in oppressive establishment of a moral sense restricting the horizon of the permissible, but also sets the direction towards the possible and the tangible which permits dreams of early childhood to be attached to goals of an active adult life.

Stage 4 - Industry vs. Inferiority

- To bring a productive situation to completion is an aim which gradually supersedes the whim and wishes of play.
- The fundamentals of technology are developed.
- To lose the hope of such "industrious' association may pull the child back to the more isolated, less conscious, familial, rivalry of the Oedipal type.
- The child can become a conformist and thoughtless slave whom others exploit.

Stage 5 - Identity vs. Role Confusion (or "Diffusion")

- The adolescent is newly concerned with how they appear to others.
- Ego identity is the accrued confidence that the inner sameness and continuity prepared in the past are macthed by the sameness and continuity of one's meaning for others, as evidence in the promise of a career.
- The inability to settle on a school or occupational is disturbing.

Stage 6 - Intimacy vs. Isolation

- Body and ego must be masters of organ modes and of the other nuclear conflics in order to face the fear of ego loss in situations which call for self abandon.
- The avoidance of these experiences needs to isolation and self absorption.
- The counter part of intimacy is distantiation, which is the readiness to isolate and destroy forces and people whose essence seems dangerous to one's own.
- Now true genitality can fully develop
- The danger at this stage is isolation which can lead to severe character problem.

Erickson's listed criteria for "genital utopia" elastrate his insistence on the role of many modes and modalities in harmony:

- matuality of orgasm
- with a love partner
- of opposite sex
- with whom one is willing and able to share a trust, and
- with whom one is willing and able to regulate the cycles of worth, procreation and recreation
- so as to the offspring all the stages of satisfactory development

Stage 7 - Generativity vs. Stagnation

- Generativity is the concern in establishing and guiding the next generaton
- Simply having or wnting children does not acheive generativity
- Socially - valued woek and disciples are also expression of generativity

Stage - 8 Ego Integrity vs. Despair

- Ego integrity is the ego's accumulated assurance of its capacity for order and meaning.
- Despair is signified by a fear of one's own death, as well as the loss of selfsufficiency, and of love partners and friends.
- Healthy children, Erickson tells us, won't fear life if their elders have integrity enough not to fear death.

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http://en.wikipedia.org/wiki/Psychosexual development

3.5 Review questions

1. What are the principles of human growth and development?
2. What are basic ideas behind the theories of development?

Unit 4 □ Role of Heredity and Environment

Structure

4.1 Introduction

Starting from the prenatal stage human organism undergoes changes of various kinds. During the total life = span of an individual number of changes and development take place. These changes or developments in the life of different individuals are similar in most cases. Nevertheless we can marse some differences too. Thus, it can be said that there are both - generality and specificity in the changes of human organism in different individuals. There are some factors responsible for such changes and the same are the matter of study of Developmental Psychology.

While analysing the aspect of human behaviour and human growth, it is marked that the changes take place in both the areas (human growth and human behaviour) with the structural growth of organism. Passage of time is the principle determinant of such changes. The other determinant is the maturity of individuals which is the direct product of experience. For example, a child starts crawling followed by unbalanced and then balanced walking at certain stages of age. He starts understanding the instructions, responding using words and then small sentences at different age brackets. As a person grows older, varieties of such changes would automatically follow. These changes or developments of muscles and sense organs etc. are sensory-motor in character. These are principally dependent on factors related to the structural developments or changes of the organism.

On the other hand, when it becomes possible for a child to recognize the voice or face of his father, mother or other family members, it is the result of experience. As a general process development encompasses both the changes. So in brief we can say that the changing pattern of responses to the stimuli of different kind which are observed in human organism at different stages of life is the human development.

4.2 Characteristics

The changes as mentioned earlier, have some general and specific characteristics. For example, some predictable orderly growth take place with the structural growth of an individual. Generally eruption of teeth and development of crawling capacity takes place within the first year of life of any individual. Similarly one can start walking or talking (just using some words) between twelve and sixteen months or so. Such an order of events are generally consistent in case of all individuals. However, it can not be a rule. To some extent it may differ from child to child or person to person. The growth rate may be foster in case of some and alower in case of others. Persons of same age may or may not have same kind of maturity or personality development.

The second characteristics is that a general behaviour in one stage can well become a specific behaviour in a later stage.For example, at the initial stage emotions may be expressed by involving the whole body. At a later stage it can be expressed quite differenly - even by using a single sign. The vice versa is also correct. A specific behaviour in the early stage may turn into a general behaviour at later stage. Disliking for grandfather may lead to the stage of disliking old people in general. Thus it can be said that there is every probability of change in the behaviour - general to specific or specific to general at different stages.

Thirdly, in spite of physical similarities such as age and physical growth etc. response pattern of different individuals may be different. Even if they stay together, share some experience work together because of the differences in their inner strength such as capabilities, aptitude, interest, values etc. They may experience and manifest differently. This is not only true in case of adults, it is applicable to the children also. Children of same age and physical growth may also behave or response differently.

4.3 Influence of heredity and environment

The narration made above has given some indication that heredity and environment play important role in the development of human being. The psychologists are, ofcourse, not having the same opinion with regard to the extent of influence of heredity and environment in shaping the behaviour of individuals, particularly the adults. There are some who firmly believe that the influence is enormous. There are others who are not in favour of the same opinion. Sidelining the debate one can say that human behavior can not be explained properly by any of the opinions. But one cannot deny that influence of heredity and environment is a reality in all the stages of development. Another point to note is that neither heredity nor environment alone can produce

results. But are equally important.

To understand the influence of heredity studies conducted through

(i) Pedigree Method

(ii) Cytological examination

(iii) Indepth study of identical twins

In the first method efforts were made to trace out the hereditory transmission of the traits from generation to generation. Galton, who conducted important studies on the issue, stated that it is 'natural gifts' passing from one generation to other that really helps individual human beings to develop. It does not depend much on training but on heredity. His findings clearly state that even the physical traits like eye colour hair, nose also have dominance of inheritance.

Under cytological examination powerful microscope was used to reveal 'The presence or absence of cell-content that is supposed to be transmitted to next generations'. The result is not same. In some cases its presence was marked and in other cases its absence was marked.

The third method i.e. study of identical twins makes a point clear that identical twins whether reared in the same or different environment produces more similarity in physical and mental characteristics. But the characteristics differ at different rates if ordinary twins or other siblings are reared in the same environment.

Different studies reveal that children of underprivileged section of population can gain upto some extent if they get chance to live in enriched environment. It does not ensure to gain profusely. Particularly increase in the level of intelligence is not expected to be high enough. At the same time it is marked that some specific skills such as numerical skill, power of giving attention, communication skill and level of motivation get comperatively more increased under the same enriched environment. The above noted findings give an indication that though not in all, environmental factors play a definite role in certain areas of human behaviour.

4.4 Conclusion

The long-drawn debate on the effectiveness or influence of heredity and environment have almost been settled by now. Today it is clear that neither heredity nor environment alone can determine the nature of human behaviour. To-day it is believed that behaviour is nothing but the product of interaction of heredity and environment. It is also believed that hereditary factor poses a 'reaction range' that makes clear the

reachable levels.

4.5 References

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4.6 Questions

1. What is the nature of development of the human organism?
2. Analytically describe the influence of heredity and environment on human being.

Unit 5 □ Personality : Concept and Theories

Structure

5.1 Definition and General Overview

Since at least the early Greek civilization, and probably far longer, it has been recognized that people are not different just physically, but also in profound psychological ways. The dispositional perspective is the traditional, classic approach to the psychological study of personality. A ***personality trait*** may be conceptualized as a consistent way of perceiving, thinking, feeling, behaving, that people carry around with them, for which people differ consistently between situations and over time (Carver & Schier, 2000). The major assumptions underlying the dispositional perspective are -

1. Situational Stability
2. Temporal Stability
3. Heritability

Traits are scientific constructs. Traits can be defined as "dimensions of individual differences in tendencies to show consistent patterns of thoughts, feeling and actions" (McCrae & Costa, 1990). The definition suggest that personality traits are endogenous dispositon that unfold almost under any circumstances; i. e. there is a biological determinant of personality trait. At birth infants have recognizable patterns of behaviour and emotional response ***(Temperament)*** (Thomas, Chess and Birch 1968), that precede experience but lead to later personality dispositions. Temperament often contrasted with character; the later was thought the result of socialization experiences rather than biological dispositions. However, it would be a serious mistake to conlude from that personality traits are purely biological phenomena, impervious to cultural and interpersonal effects. Infact every ***trait*** is ***expressed*** in a ***culturally conditioned way.*** So every extravert must learn the culturally dictated forms of emotional response and social interaction in order to express his / her innate enthusiasm and sociability.

5.2 Early Theories of Personality

- In the second century BC, Galen outlined a theory of personality, which stated that there were essentially three domains of the human psyche : the ***cognitive*** or intellectual domain, ***conative*** or intentional domain and ***affective*** or emotional domain.
- **Somatotypes :** Kretschmer (1925) and Shelden (1954) proposed personality theories based on body shapes. Kretschmer made basic distinctions of body types - "asthenic" or people who are frail and thin, "pyknic" or people who are plump and rounded and "athletic"or people who have strong muscular physique. He proposed that specific mental illness tended to be associated with specific somatotypes outlined by Kretschmer. He argued that ***ectomorphs*** (thin, frail people) have pronounced tendencies to be introspective with restrained characters; ***mesomorphs*** (robust, muscular people) tended to be hearty and insensitive; ***endomorphs*** (plump, rounded people) tended to be jolly and easy going.

5.3 Classical Psychoanalytical Theory

- **Topographical Model** - Freud formulated a model of mind as being constructed a bit like an iceberg, with four-fifth of it buried under the surface. The **conscious** mind represents the part of the iceberg clearly visible and apparent to the individual. The part of the iceberg immediately below the surface represented the **preconcious**, and consisted of thoughts, ideas and beliefs, which might be temporarily forgotten but could be, retrieved easily when they were wanted. A large invisible, submerged part of the iceberg, which represented the **unconscious**, contained the disturbing and emotionally significant ideas and memories and exerted a powerful, though unseen influence on the conscios and the preconscious. The unconscious may be regarded as the bulk of the individual's psychic self.
- **Psychoeconomic Model** - assumes that each individual has a given amuont of psychic energy available and that the probability that a certain response occur depends on the quantity of energy of invested in such a response. Furthermore, as more energy is required to fight encroaching pathology, less is available for adaptive, creative activities.

- **Structure of Model** - The psychic apparatus is composed of three interactive systems - id, ego and superego. The id is present at birth, represent instinctual energy and exists on an unconscious level. Id is governed entirely by the pleasure principles and demands immediate gratification of its impulses. The ego tries to mediate between the id impulses and the individual's perception of external reality by delaying the gratification of id impulse until the environmental conditions are appropriate. The superego comes into being when the individual, in the process of socialization, internalizes the values, norms or beliefs of caregivers and external control is replaced by self-control. The superego strives towards unattainable perfection and the ego as an executive agency of personality has to mediate constantly between id and superego.
- **Psychosexual Stages** - Individuals negotiate between emerging sexual and aggressive instincts, unavoidable frustrations, anxieties centered on crucial pleasure-seeking, tension-reducing prototypes at differnt ages. ***Erogenous zones*** are areas of the body that predominates children's pleasurable interactions with their environment. Undue gratification or frustration at a particular erogenous zone brings about ***Fixation.*** This may delay or interrupt the development from one stage to another. Also such fixations can motivate individuals to seek new paths as they try to maximize the pleasure obtained in the interaction with others.

  1. Oral Stage (0 - $1^{1}/_{2}$ years or 2 years) - the erogenous zone is oral cavity. Pleasure and tension reduction is associated with sucking, swallowing and ingesting. Freud suggests that individuals who are fixated at this stage derive considerable pleasure in adulthood by overeating, smoking, kissing, sucking thumb, taking knowledge, sceneries, and compliments. Such individuals are referred to as **oral-incorporative** characters.

  Fixation at the teething stage may be later manifested as nail bitting, sarcasm, cynicism and critical attitude. This is called **oral-sadistic** characters.

  2. Anal Stage (2 - 6 years) - Anal region is the erogenous zone. At this stage the childern are provided with toilet training. The toddlers move about, explore their environment and become more autonomous. Fixation at this stage either produces individuals who derive pleasure from giving away their possessions (**anal-expulsive**) and those who are stubborn, stingy (**anal-retentive**).

3. **Phallic Stage** (6 - 11 years) - children develop an incestuous attraction toward the opposite sex parent (***Oedipus Complex*** in case of boys; ***Electra Complex*** in case of girls). But they are afraid of punishment from the same sex parent. In case of boys, this fear is called the "castration anxiety". Positive resolution of these complexes brings about positive identification with the same sex parent and the crystallization of the psychic structure of superego.
4. **Latent Stage** (11 - 13 years) - during this stage sexual impulses are rechanneled into nonsexual activities like academic learning, athletic performance, social development, peer group affiliation etc.
5. **Genital Stage** (13 years and above) - the sexual instinct becomes outwardly focused. There is an incresed investment of libido in the opposite sex.

- **Defense mechanisms** - the ego uses defense mechanisms to protect the psyche from anxiety or imminent threat to one's sense of security or integration.

1. Repression - pushing unwanted thoughts and emotions out of conscious awareness.

2. Denial - refusing to acknowledge an unacceptable or unpleasant event or stimuli.

3. Projection - unconscious attribution of unacceptable impulses to others.

4. Reaction Formation - expressing unacceptable impulses and desires in an exaggerated and opposite manner.

5. Rationalization - justifying or trying to logically explain the unacceptable desires or impulses.

6. Displacement - substituting a more threatening impulse by a less threatening one.

7. Sublimation - substituting an unacceptable impulse into socially acceptable from.

8. Regression - return to an earlier stage of behaviour in face of extreme stress.

- **Critical Evaluation -**

1. The symbolizations and abstractions used in the psychoanalytical literature are not absolute and universal.
2. Psychoanalytic judgements are highly subjective and not readily amenable to statistical analysis.

3. Freud based his theory from a limited sample of women, suffering from specific problems. Generalizing from such a limited sample may mean that the concerns of this sample may not have been those of the general population.

5.4 Ego Psychology

In ego psychology, there is a shift in focus from the role of id in psychic life to that of the ego as primary means of understanding the individual.

Erickson proposed that during the course of human development, the ego progresses through a sequence of 8 stages, At each specific stage, the ego is confronted with a ***psychological crisis*** that is unique to that particular stage. The positive resolution of each crisis energizes the ego and facilitates its management of the following psychological challenges. With the resolution of every crisis, the ego acquires an additional measure of strentgh called ***virtue.***

- **Trust vs. Mistrust** (infancy) : virtue is hope. To gain a balance between trusting people or being mistrustful or being unable to relate to others fully. It depends to the extent, which as children individuals have been adequately nurtured by their primary caregivers, specially mother.
- **Autonomy vs. Shame & Doubt** (second year) : virtue is will. To develop a sense of personal agency and control over behaviour and actions and to mistrust one's personal abilities and anticipate failures.
- **Initiative vs. Guilt** (3 - 5 years) : virtue is purpose. To develop an increasing sense of personal responsibility and initiative or increased feelings of guilt and doubt.

  The development during these stages are a function of the balanced discharge of autonomy and disciplining by parents.
- **Industry vs. Inferiority** (6 - puberty) : virtue is competence. To learn to overcome challenges through systemic effort or to accept failure and avoid challenges, leding to an increasing sense of inferiority.
- **Identity vs. Role Confusion** (adolescence) : virtue is Fidelity. To develop a consistent sense of personal identity faced with the changes in the social role and expectations of adolescence. Or simply to become overwhelmed by choices and expectations and to fail to develop a sense of consistent inner self.
- **Intimacy vs. Isolation** (early adulthood) : virtue is love. To develop intimate and trusting relationships with others or to avoid relationships as threatening and painful.

- **Generativity vs. Stagnation** (middle adulthood) : virtue is care. To develop a productive and positive life incorporating recognition of personal achievements as well as need to nurture and care for one's forthcoming generation.
- **Ego Integrity vs. Despair** (old age) : virtue is Wisdom. To be able to look back on one's life in a positive fashion and evaluate whether has been futile or worthwhile.

5.5 Humanistic Theory

Humanistic theories are distinctive because of their fundamental assumptions that deem them humanistic :

1. Emphasis on people as self reflecting agents who has capacity for choice and determination.
2. Emphasis on the subjective or phenomenological reality of the individual.
3. Emphasis on the capacity of the individual to evaluate to experience in terms of higher order needs and values.

Rogers assumed that human beings are born with an innate tendency to develop their meager potentials; they learn from experiences, are creative and ***actualize themselves*** if conditions for doing so are adequate. This capacity for actualization is equated with optimal and healthy functioning.

"Self" was defined by Rogers as consisting of all memories, feelings, knowledge that an individual accrues over his life span and is composed of the perceptions of the relationships of the "I" and "me" to the others and to the various aspects of life together with the values attached to these perceptions. Thus, Rogers conceived of the self as a process in relationship with the world at large. According to him, as an infant begins to differentiate himself from the environment a self-structure begins to take shape and the self is formed as a result of interaction with the environment, particularly interactions which the person is being evaluated.

The ***ideal self*** is that aspect of the person that represents how the person would like to be. The ***self-concept*** refers to how the person views himself. These two aspects may be consistent with each other or incongruent with each other.

As the infant or the child are initially dependent on the significant others for support and survival, human infants have a inborn need for positive regard of those on whom we are dependent, in order to insure our physical and psychological survival. Attachment to significant others are is facilitated by this need for positive regard and the values and standards of significant others are internalized.

These internalized values and standards are called **'conditions of worth'.** It is from these condition of worth that people come to develop a sense of self-regard, depending upon the degree to which they perceive themselves as measuring up to those internalized standard.

Rogers identified three possible modes of personality functioning

1. To organize experiences into some relationship with the self
2. To ignore experiences as it appears to have no relationship with the self-structure.
3. To distort experience as it is discordant with the self-structure.

The cornerstone of **healthy functioning** according to Rogers is - **openness to experience, flexibility,** and **adaptibility** - resulting in a state of **congruence.**

Unit 6 □ Motivation of Human Behaviour : Concept, Theories and Types; Biological and Social Motives

Structure

6.1 Introduction

Systematic study of motivation enables the social workers to know the motives, or desired goals, which underlie behaviour. It will also be helpful in knowing "Why do people behave and think as they do?" "Why do people choose the particular goals for which to strive?" "Why does behaviour take one form and not another?" and "What makes people behave differently from-or similarly to-each other?" By attempting to understand the process of underlying aspects of human functioning, as it is presumed, social workers will have a comprehensive understanding of specific determinants of human behaviour.

6.2 The Concept of Motivation

1. The word motivation came from the latin word *movere,* which means "to move". According to the Oxford English Dictionary motivation is 'the conscious or unconscious stimulus for action towards a desired goal provided by psychological or social factors; that which gives purpose or direction to behaviour' Benjamin B. Lahey defined motivation as an internal state that activates and gives direction to our thoughts. He further elaborated the term by saying that motives are at the centre of our lives-they arouse and direct what we think, feel and do. According to Robert A. Baron motivation is internal processes that can't be directly observed in the situation but which are real, neverthless, and which serve to activate, guide and maintain peoples' actions. Motivation, as George Miller stated, is 'all those pushes and prods-

biological, social and psychological that defeat our laziness and moves us either eagerly or reluctantly to action.' Richard W. School defined Motivation as the force that :

A. Energies Behaviour - What initiates a behavior, behavioral patterns, or changes in behaviour? What determines the level of effort and how hard a person works? This aspect of motovation deals with the question of "What motivates people?"

B. Directs Behavior - What determines which behaviors an individual chooses? This aspect of motivation deals with the question of choice and conflict among competing behavioral alternatives.

C. Sustains Behaviour - What determines and individuals level of persistence with respect to behavioral patterns? This aspect of motivation deals with how behavior is sustained and stopped (2002).

Philip G. Zimbardo and Ann L. Weber opined that *Motivation* includes the internal mechanisms involved in *preferring* one activity over another; the *strength* of responses ; and the *persistence* of actions toward relevant goals. According to them the concept of motivation is being used for five basic purposes :

1. *To account for behavioural variability.* We use motivational explanations when the *variations* in people's performance in a constant situation cannot be traced to differences in ability, skill, practice, reinforcement history, or chance.
2. *To relate biology to behaviour.* We are biological organisms with internal mechanisms that automatically regulate our bodily functions so we can survive. States of deprivations trigger these mechnisms which then motivate us-through hunger, thirst or cold-to act to restore the body's balance.
3. *To infer private states from public acts.* There are two ways to respond to someone's behaviour: take it at facevalue or see it as a symptom or overt expression of an underlying emotion or motive. Researchers in cognitive and social psychology are investigating the inferences that people make about what causes behaviour, whether it is their own or other's. For example, if the one you love forgets to call you on your birthday, you may see this forgetfulness as asign of neglect, whereas if you are forgetful one, you may blame your error on the stress of your busy life.
4. *To assign responsibility for actions.* The concept of personal responsibility is basic in law, religion and ethics. Personal responsibility presupposes inner motivation and the ability to control one's actions. The concept of personal responsibility dissolves without the concept of consciously directed motivation. We call such behaviour volitional (willful) or intentional. If we did not hold

people personally responsible for their actions, we would not praise them for their success or punish them for their crimes.

5. *To explain perseverance despite adversity.* Finally, motivational constructs help us understand why organisms can continue to perform consistently despite obvious variations in stimulations. Motivation gets you to work or class on time even when you're exhausted. Motivation helps you persist in playing the game to the best of your ability even when you are losing or suffering and realize that you can't possibly win.

Some basic concepts about motivation (as found in http://www.nos.org/psy12/p2h10.1.htm)

The force or push which activates the organism to action has been variously called need, motive, goal, instinct, drive or desire. It is necessary to distinguish between the meaning of these terms.

(a) Needs :

A need is a condition of lack of deficit* of something required, which the organism finds necessary to satisfy in order to maintain its existing balance.

Needs are of different types, the need for food or water is a physiological need, which arises out of-lack or deficit of food or water in the organism. The need for exertion and urination which are also physiological needs are due to the organism's necessity to eliminate waste matter from the body. The need for contact with other persons around is a social need. The other social needs may be need for prestige, money, status, affection, self-esteem and so on. A person becomes more aware of his needs when there is a deficit in their fulfil ment. In other words, when an individual is in a state of deprivation he recognizes his needs. When you are hungry, you need food, when you are thirsty you need water. In these cases you are in a taste of deprivation and your bodily system suffers from imbalance. The needs may be broadly categorised as, primary basic or physiological needs and secondary or social needs. Need for food, water, sex, sleep and rest, elimination are primary needs. Need for achievement, affiliation, power are social needs.

(b) Motives :

The term 'motive'refers to goal directed behaviour and energizing conditions within the organism that drives behaviour. It is generally used to refer to certain conditions within the individual which, besides arousing, actually predisposes him to respond, or behave in a way appropriate to the satisfaction offends. motives direct the activity of the individual towards his goals. Therefore, sometimes hunger and thirst are referred to as motives,. If you are deprived for 24 hours, and when provided food, you rush because you are motivated by hunger.

(c) Goal :

A goal is something you think, will contribute to the satisfaction of a need or motive. If hunger is a need, eating food is a goal. Most of our Behaviour is goal directed. Goal is related to the need. However in a few cases, Behaviour is guided by intrinsic motive. It means the Behaviour does not need external goal.It is satisfying and enjoyable by itself. Some people may like to sing, dance or play just for the sake of singing, dancing or playing. They like such activity.

(d) Instincts :

An instinct is an innate biological force that predisposes the organism to act in a cretain way. At one time all of our Behaviour were supposed to be the result of instincts. Some of the instincts identified are fight, repulsion, curiosity, self-abasement, acquisition etc. It was thought that instincts were inherited and compelling sources of conduct, but can be modified by learning and experience. This term is no more used in relation to human Behaviour. Animal Behaviour is sometimes explained using this term.

(e) Desires :

Desires connotes purely psychological feelings which may or may not have psychological sources. It is often used to denote what one is wanting to have. Generally "desire" word is used in a basic sense of strong inner urges. Indian psychological literature uses this term to explain all misery arid stress.

6.3 Theories of Motivation

There are several distinct theories of motivation to answer the questions like why some people seem to be very successful, highly motivated individuals? Where does the energy, the drive, or the direction come from? However, we will discuss only those theories which received most attention from the social work practitioners.

Instinct Theory

All humans and animals are born with certain in-built behaviours and knowledge about how to survive. These behaviours and knowledge are preprogrammed at birth and they are in the genes of humans and animals. For example a spider can spin webs even if it never saw a web before. In addition human babies are born with the ability to cry that helps them to be understood that they are hungry.

Three functionalist psychologists - William James (1890), William McDougall (1908) and Sigmund Freud (1915) focused their attention in identification of brain mechnisms that work with environmental cues in producing instinctive behaviour. According to William James instincts are purposive in nature as they are helping the

people and animal to adjust with their environment. To William McDougall instincts are inherited dispositions with three aspects-energizing aspect, action aspect nad goal directedness. However to Freud instinct has different kind of meaning-it has no conscious purpose as well as no predetermined direction as most of the instincts are in operations unconsciously. But the operation of instincts in the organisms, he further elaborated, has tremendous impact on the thought process, feelings and actions of the people and sometimes placed them in the opposite direction of society's demand.

But there is no consensus on the numbers of primary instincts. According to William McDougall there are only 18 instincts whereas sociologist Bernard stated that there are 5,759 instincts that are in operation in the organisms. Robert S. Feldman criticized the theory by saying that explanations based on the concept of instincts do not go far in explaining *why* a specific pattern of behaviour, and not the others, has appeared in a given species. He further stated that although it is clear that a significant amount of animal behaviour is based on instincts, the variety and complexity of human behaviour, much of which is learned, cannot be seen as instinctual. In addition, learning theorists have proved that organisms learned behaviour much early; it is not that they are born with the innate behaviours. Lastly findings of the research work of Ruth Benedict (1959) and Margaret Mead (1939) contradicted the very assumption of the instinct theory i.e. universal motives govern human behaviours.

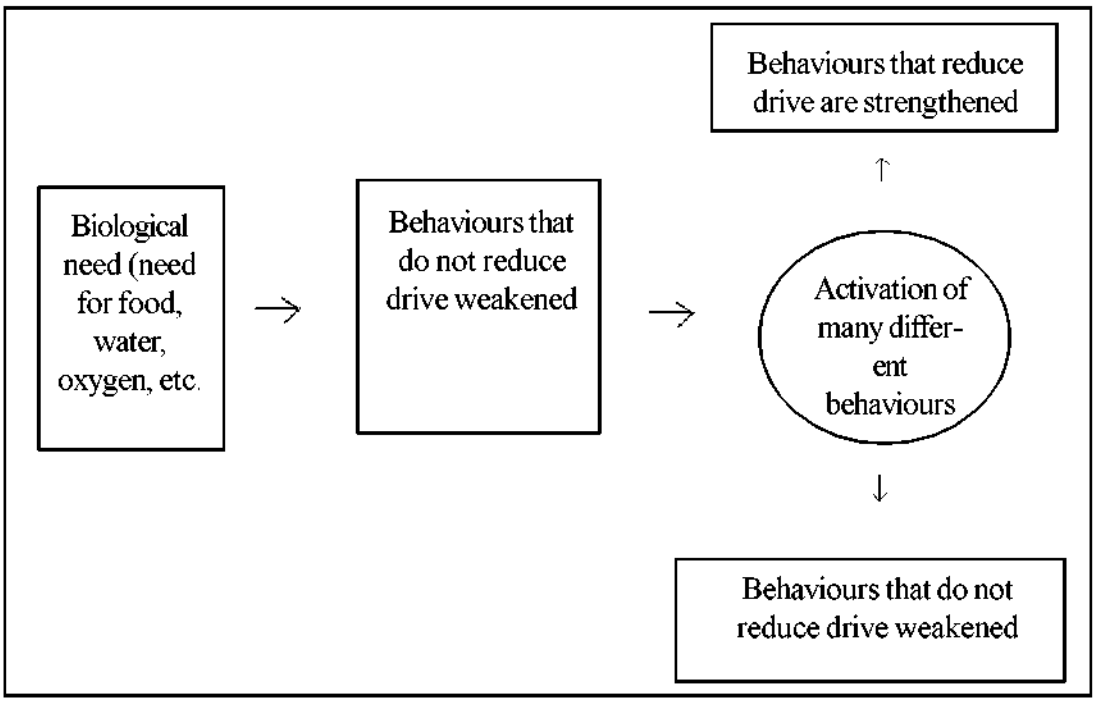
Drive Reduction Theory

In 1918 Robert Woodworth first conceived the concept of motivation as an inner drive which determines human behaviour. According to him drive is a non-specific energy in the organisms which fuels actions of them through triggering stimuli. He also said that drives are available in the organisms to be channeled into the goal-directed activities.

This theory however, fully developed by Clark Hull (1943, 1952). According to him all organisms have internal biological needs that motive them to behave in specific ways. These needs considered as drives defined by Hull as internal states of arousal or tension that must be reduced so that people may maintain a sense of internal calmness.

Drive-reduction, in Hull's view was what motivated and energized learning : a rat would learn to press a lever in a Skinner box only because it was hungry, and because the food reward reduced that hunger (Hayes, 2000). This theory assumes that physiological disequilibrium (i.e. change of a factor connected to equilibrium, such as the level of glycosis in the bloodstream) arouses *primary needs* (for food, water, rest, safety etc.) that are associated with tensions which generate energy (drive) to motivate the organisms to act for the restoration of the initial equilibrium (Demetriou,

et al. 1998). Thus according to drive theory, motivation is basically a process in which various biological needs push (drive) us to actions designed to satisfy these needs (Baron, 2010).



Source : Adapted from Psychology, 5th Edition, Robert A. Baron, 2001.

Here, according to Baron, behaviours that work-ones that help reduce the appropriate drive are strengthened and tend to be repeated. Conversely, he further added that those that fail to produce the desired effects are weakened and will not be repeated when the drive is present once again.

Although the drive reaction theory explained how primary drives motivate behaviours of the organisms but this drive reduction model of motivation suffers from several drawbacks.

1. It is quite common that people often involve themselves in the actions that are increasing instead of decreasing drives such as avoiding fatty foods as a part of dieting.
2. Humanistic psychologists such as Carl Rogers argued that higher-order needs like the need for self-actualization were fundamental to human beings, and not simply the outcome of an elaborate chain of associations from feeding in
3. infancy or the sublimation of the sex drive (Hayes, 2000).
   According to Feldman both curiosity and thrill-seeking behaviour shed doubt on drive-reduction approaches as a complete explanation for motivation. In both cases, rather than seeking to reduce an underlying drive, people and

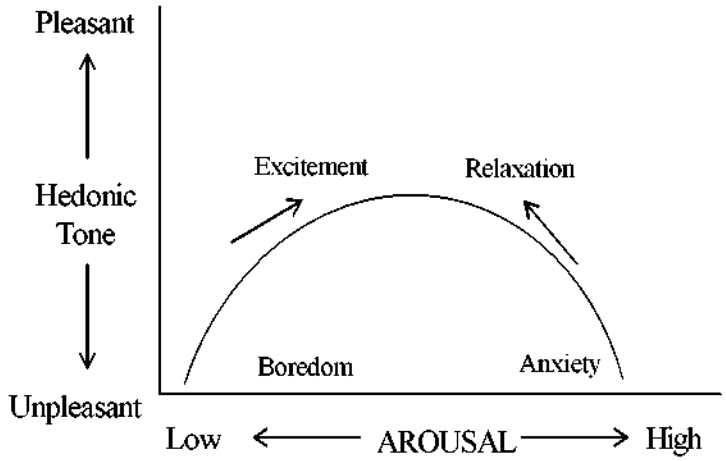
animals appear to be motivated to increase their overall level of stimulation and activity.

Arousal Theory :

The term 'arousal' is generally used to describe a general state of physiological activation. Once could think of it as the extent to which one's body and mind are "revved up". The Arousal Theory first pointed out that people are motivated to maintain a level of arousal that is optimal, neither too high nor too low in ordrr comfortable. Essentially, if arousal is too low, a person feels boredom, and seeks stimulating experiences to become motivated; conversely, when arousal is too high, one seeks to reduce arousal in a less stimulating environment. Hence the theory argued that humans are seeking not minimal levels of arousal but optimal arousal the level that is best suited to our personal characteristics and to whatever activity we are currently performing, for example if you are knitting, whittling, or performing similar activities, a low level of arousal will be optimal and will be preferred, but if you are competing in a sports event a much higher one will be best (Baron, 2001). This optimal level of arousal varies from person to person.

OPTIMAL AROUSAL MODEL

(Hebb, 1955)



Source : http://reversaltheory.org/RT Theory Motiv.htm#Arousal

From the writings of Philip G. Zimbardo and Ann L. Weber came to know that for the hungry and thirsty rats in the Columbia Obstruction Box, as motivation increased, the curve of performance first rose and then later declined over time. This pattern, an *inverted U-shaped function,* suggests that too little or too much motivation may impair performance.

Now from that observation it can be safely said that this theory has a link to the concept related to the efficiency of our performance in various situations. If arousal

is too low, performance will be inadequate; if it's too high, performance may become disrupted and disorganised (Lahey, 2002). This concept is popular in the name of Yarkes-Dodson Law. Wikipedia gave details about the law by saying the following - "the **Yarkes-Dodson law** demonstrates an empirical relationship between arousal and performance. It dictates that performance increases with cognitive arousal but only to a certain point : when levels of arousal become too high, performance will decrease. A corollary is that is an optimal level of arousal for a given task".

The arousal theory is suffering from the following limitations -

1. Since the optimal level of arousal varies from peson to person like a sensation seeking person, or a person who prefer a much less stimulating environment, it cannot entirely explain motivation.
2. Arousal being complex could be expressed in various types of functions and actions. It should not be regarded as a single, centralized, driving force.

Expectancy Theory

This theory, which was put forward by Victor Vroom in the year 1964, proposes the following equation (Huitt, 2001) :

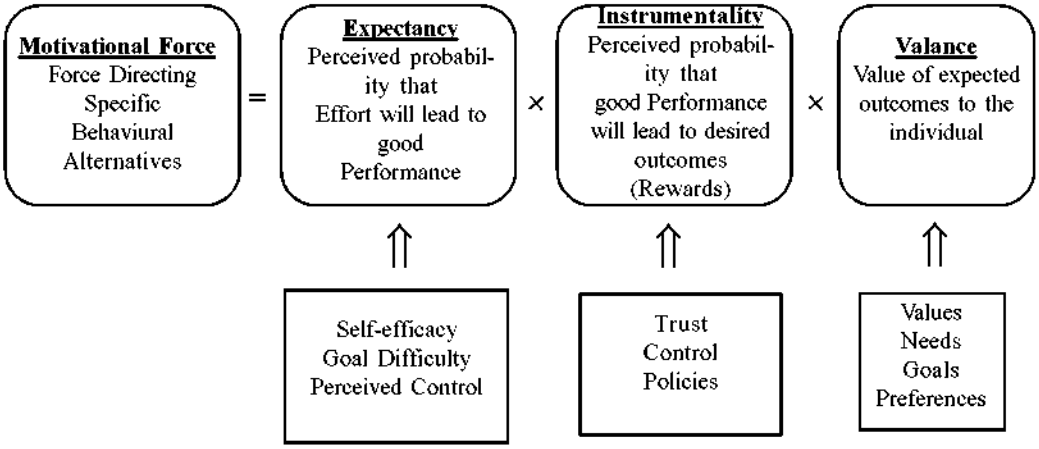
Motivation = Perceived Probability of Success (Expectancy) $\times$ Connection of Success and Reward (Instrumentality) $\times$ Value of Obtaining Goal (Valance, Value)

The motivational force for a behavior, action, or a task is a function of three distinct perceptions which are the following (as written by Richard W. School, 2002)

Expectancy - Probability (E ->P) : The expectancy is the belief that one's effort (E) will result is attainment of desired performance (P) goals. This belief, or perception, is generally based on an individual's past experience, self confidence (often termed selfefficacy), and the perceived difficulty of the performance standard or goal.

Instrumentality-Probability (P->R): the instrumentality is the belief that if one does meet performance expectations, he or she will receive a greater reward. This reward may come in the form of a pay increase, promotion, recognition or sense of accomplishment. It is important to note that when it is perceived that valued rewards follow all levels of performance, then instrumentality is low. For example, if a professor is know to give everyone in the class an "A" regardless of performance level, then instrumentality is low.

Valance-V(R): The valance refers the value the individual personally places on the rewards. This is a function of his or her needs, goals, values and Sources of Motivation.



Source : http://www.cba.uri.edu/scholl/Notes/Motivation Expectancy.html

Humanistic Theory

The humanistic theory was put forward by Carl Rogers (1961) and Abraham Maslow (1954 and 1970) who perceived that both behavioral and Freudian psychological explanations of motivation are inadequate in answering the question - "why people act as they do"?

According to Rogers generally people have two fundamental needs and fulfillment of theseneeds is necessary for good psychological health of human beings. The needs are following (as stated by Hayes, 2000)

1) *Need for Positive Regard* - every one needs to be seen positively by others, in some way. For most people this means love - from a loving family, or a loving relationship in later life. But Rogers argued that it was possible for people to settle for respect or approval: as long as they were regarded positively by someone, that need could be assuaged although loving relationships were more fulfilling. The need for positive regard, in Rogers' view is a basic need, and one which could not be left unfulfilled without psychological harm to that person.
2) *Need for Self-actualization* - is concerned with the human tendency for personal growth. If we look at the pastimes and hobbies which most people engage in, we find that they are almost always concerned with learning or developing skill-even if it is only in computer games. Rogers argued that to develop oneself, and to make real (actualize) one's abilities and talents, is a basic need in all human beings, and that psychological harm would result if this need is not expressed in some way.

One of the most widely mentioned theories of motivation is the hierarchy of needs theory put forward by Abraham Maslow in his 1943 paper *A Theory of Human Motivation,* which he subsequently extended. His theory contends that as humans meet

'basic needs', they seek to satisfy successively 'higher needs' that occupy a set hierarchy (Wikipedia).

Maslow is probably the best known proponent of this theory. According to Francis Heylighen (1991) what distinguishes his work from that of other "humanists"., such as Curl Rogers or Erich Fromm, is that he proposes a model of how a happy, healthy, well-functioning person behaves, which is based on concrete observations of real people, rather than on formulating ideal requirements. Moreover Maslow proposes a simple and intuitively appealing theory of motivation, which explains where such a "self-actualizing" personality comes from. In parallel with systems theory, Maslow reacts against too much reductionism in psychological modelling, and proposes an alternative holistic approach of personality research.

Maslow proposed that human behaviour is motivited by a set of basic needs, which needs are most active in driving behaviour depends on two principles 9Heylightn. 1991) :

1) a need which is satisfied no longer active; the higher the satisfaction, the less the activity (the exception to this rule is the need for self-actualization, see further);
2) needs can be ordered in a hierarchy, such that from all the non-satisfied needs, the one which is lowest in the hierarchy will be the most active. A lower need is more "urgent" in the sense that it must be satisfied before a higher need can take over control.

Maslow's model considers different motivational needs to be ordered in a hierarchy and it suggests that before more sophisticated higher-order needs can be met, certain primary needs must be satisfied (Maslow, 1970, 1987 in Feldman, 2004). Generally model is portrait as a pyramid in which physiological needs are displayed at the bottom and the higher needs placed in the subsequent steps.

However, as Maslow pointed out that all of these needs are not equally important at one time, instead, they are organized hierarchically, with each different level of needs resting on the assumption that the ones underneath have been satisfied (Hayes, 2000). When the lower needs have been met, then motives to develop relationship with others, to achieve a positive self-esteem, and to realize one's full potential ethically, artistically, and philosophically (self-actualization) become important to the individual (Lahey, 2002).

(Abraham Maslow, Motivation and Personality, 1954)

The five levels of Maslow's theory consist of (as written in Wikipedia) :

Physiological needs

The physiological needs of organism, those enabling homoeostasis, take first precedence. This consist mainly of :

the need to breath

the need forwater

the need to eat

the need to dispose of bodily waste material

the need for sleep

the need to regulate the bodily temperature

the need for protection from microbial aggressions (hygiene)

When some of needs are unmet, a human's physiological needs take the highest priority. As a result of the prepotency of physiological needs, can control thoughts and behaviors, and can cause people to feel sickness, pain and discomfort.

Maslow also places sexual activity in this category, as well as bodily comfort, activity, exercise, etc.

Safety needs

When the physiological needs are met, the need for safety will emerge. Safety and security ranks above all other desires. These include :

Security of employment

Security of revenues and resources

Physical Security - violence, delinquency, aggressions

Moral and physiological security

Familial security

Security of health

A properly-functioning society tends to provide a degree of security to its members.

Sometimes the desire for safety outweighs the requirement to satisfy physiological needs completely.

Social needs

After physiological and safety needs are fulfilled, the third layer of human needs are social. This involves emotionally-based relationships in general, such as friendship sexual intimacy, and/or having a family. Humans want to be accepted and to belong, whether it to be clubs, work groups, religious groups, family, gangs, etc. They need to feel loved (sexually and non-sexually) by others, and to be accepted by them. People also have a constant desire to feel needed. In the absence of these elements, people become increasingly susceptible to loneliness, social anxiety and depression.

Esteem needs

Humans have a need to be respected, to self-respect and to respect others. People need to engage themselves in order to gain recognition and have an activity or activities than gives the person a sense of contribution and self-value, be it in a profession or hobby. Imbalances at this level can result in a low self-esteem and inferiority complexes, and on the other hand, can give an inflated sense of self and snobbishness.

Self-actualization :

Self-actualization (a term originated by Kurt Goldstein) is the *Instinctual* need of a human to make the most of their unique abilities. Maslow described it as follows :

Self-Actualization is the intrinsic growth of what is already in the organism, or more accurately, of what the organism is (*Psychological Review,* 1949).

A musician must make music, the artist must paint, a poet must write, if he is to be ultimately at peace with himself. What a man can be, he must be. This need we may call self-actualization. (*Motivation and Personality,* 1954).

Maslow writes the following of self-actualizing people :

→ They embrace the facts and realities of the world (including themselves) rather than denying or avoiding them.

→ They are spontaneous in their ideas and actions.

→ They are creative.

→ They are interested in solving problems; often includes the problems of others. Solving these problems is often a key focus in their lives.

→ They feel a closeness to each other people, and generally appreciate life.

→ They have a system of morality that is fully internalized and independent of external authority.

→ They judge others without prejudice, in a way that can be termed *objective*.

In 1986, Jones and Crandall defined Self-actualization in terms of the following characteristics (Lahey, 2002)

⇒ Being dedicated to a mission in life that transcends your selfish interest

⇒ Believing that people are essentially good and trustworthy

⇒ Loving others even when you do not like their behaviour

⇒ Feeling adequate to deal with life

⇒ Being able to accept your weakness

⇒ Not being dependent on the approval of others (prefering to be yourself than popular)

⇒ Being able to express your feelings even when they are unpopular

⇒ Being unashamed of all of your emotions, even negative emotions

⇒ Being unafraid of failure

Limitations :

- Accoding to Ewen [Heylighen, 1991] : "Maslow's eclecticism [.....] seems insufficiently thought out and includes too many confusions and contradictions. His study of self-actualizers has been criticized on methodological grounds, and his theoritical constructs have been characterized as overly vague, equivocal and untastable "
- According to Heylighen though the need hierarchy seems relatively simple and consistent, the concept of self-actualization is not clearly defined. There is a difficulty with the concept of "actualization" itself, because it presupposes that there is somehow a well-defined set of potential talents and individual is capable of developing, but a human system is much too complex to allow the discrimination between "potential" developments and "impossible" ones. Moreover the definition of self-actualization as fulfillment of all the basic needs does not always correspond with self-actualization as observed in existing persons. Maslow himself acknowledges that sometimes self-actualization seems to spring from the frustration of a certain need rather than from its gratification.
- The hierarchy does not explain why an individual would risk her or his life to rescue a friend from a burning building. Similarly, the hierarchy fails to shed light

on the common occurrence of individual's ignoring spouse and children to persue self-esteem in a career (Lahey, 2002)

- Research has been unable to validate the specific ordering of Maslow's stages (feldman, 2004). There are many instances which show how people donot always conform to the idea that lower needs have to be satisfied before higher needs become important (Hayes, 2000)

Achievement - Need Theory :

David McClelland and John Atkinson are the founding fathers of this theory. They propose this theory on the basis of the Murray's (1938) theory of personality.

According to Murray the achivement motive is generally considered as a need "To accomplish something difficult. To master manipulate and organized physical object, human beings or ideas .....To attain a high standard to excel oneself .....and surpass others". This kind of need has an impact on human behaviours like effort, persistence, competition and goal oriented activities.

According to Atkinson and Birch (in Demetriou et al 1998) behaviour in achievement situations is viewed as the result of two antagonistic tendencies: the tendency to approach success and tendency to avoid failure ($T_A = T_S - T_{AF}$). If the tendency to approach success is stronger then tendency to avoid failure, the person initiates the activity: if the opposite occurs, the person does not engage in the activity and he or she may follow avoidance strategies.

In his book (1961) *The achieving society,*McClelland argued that human motivation is influenced by three dominant needs: the need for achievement (N-Ach), the need for power (N-Pow) and the need for affiliation (N-Affil). Details of the needs are being discussed here (as written in Wikipedia) -

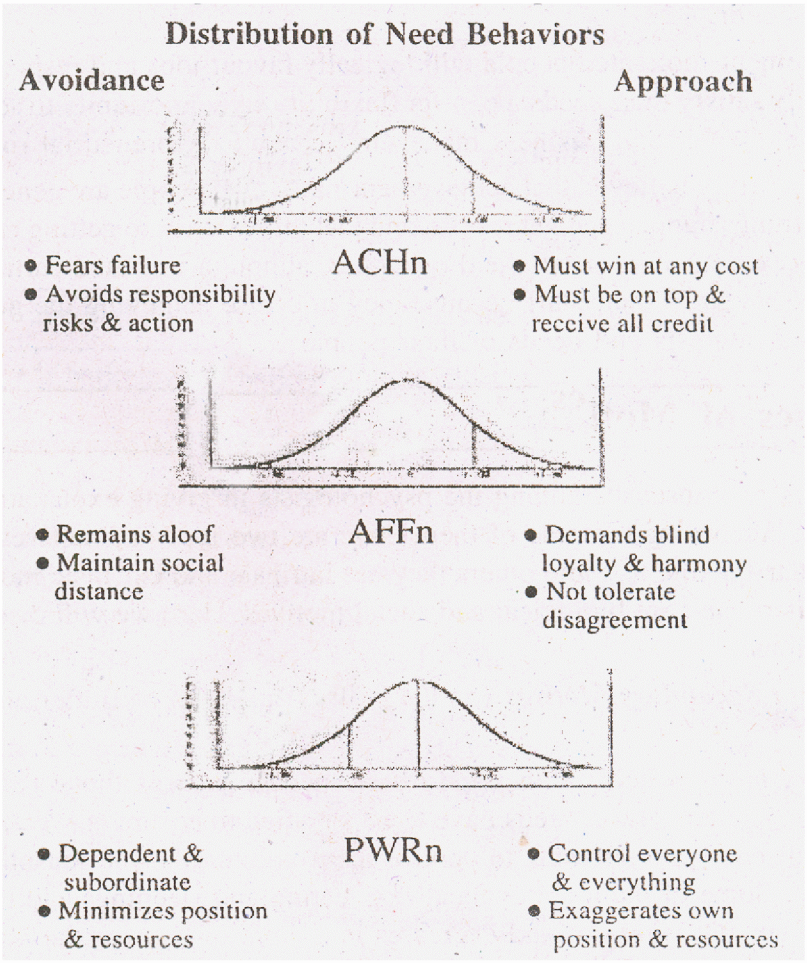
N - Ach(Need for Achievement) - is referring to an individuals desire for significant accomplishment, mastering of skills, control, or high standards. People with high N-Ach typically achieve more during there lives than people with low N-Ach. Those with low N-Ach may choose tasks with very easy difficulty, so they have a decreased chance of failure, or they may choose a difficult task, so a failure would not be embarrassing. Those with high N-Ach will choose moderately difficult task, feeling that they are challenging, but within reach. People in this group are characterised by tendency to seek challenges and high degree of independence. Many entrepreneurs may fall in this group. Their most satisfying reward is the recognition of their achievement. Sources of high N-Ach include :

1. Parents who encouraged independence in childhood
2. Praise and reward for success
3. Association of achievement with positive feelings

4. Association of achievement with one's own competence and effort, not luck
5. A desire to be effective or challenged.

N-Pow (Need for Power) is referring to an individual's need to be in charge. There are two kinds of power, social and personal. An example of personal power is what drives most corporately leaders to seek those commands. On the other hand, most people would agree that Nelson Madela likely commands social power. People with this needs are most satisfied by seeing their environment move to a certain direction due to their involvements.

N - Affil (Need for Affiliation) is a term to describe a person's need to feel like he needs to belong to a group. These individuals require warm interpersonal relationships and approval from those in these relationships is very satisfying. People who value affiliation a lot tend to be good team members, but poor leaders



Source ; http://faculty.css.edu/dswenson/web/LEAD/McClelland.html

McClelland suggested other characteristics and attitudes of achievement-motivated people (on the basis of http://www.businessballs.com/davidmcclelland.htm):

achievement is more important than material of financial reward.
achieving the aim or task gives greater personal satisfaction than receiving praise or recognition.
financial reward is regarded as a measurement of success, not an end in itself.
security is not prime motivator, nor is status.
feedback is essential, because it enables measurement of success, not for reasons of praise or recognition (the implication here is that feedback must be reliable, quantifiable and factual).
achievement-motivated people constantly seek improvements and ways of doing things better.
achievement-motivated people will logically favour jobs and responsibilities that naturally satisfy their needs, i.e. offer flexibility and opportunity to set and achieve goals, e.g., sales and business management, and entrepreneurial roles.

McClelland firmly believed that achievement -motivated people are generally the ones who make things happen and get results, and that this extends to getting results through the organization of other people and resources, although as stated earlier, they often demand too much of their staff because thye prioritise achieving the goal above the many varied interests and needs of their people.

6.4 Types of Motives

There is no consensus among the psychologists in giving explanations on types of motives. According to some of them there are two types of motives i.e. Primary and Secondary, while to some others they are intrinsic and extrinsic motivations and to some others they are biological and social motives. Here we will discuss all types of motivation.

Primary and Secondary Motives (on the basis of writings of Butler and McManus, 1998):

Primary motives help us to satisfy basic needs, such as those for food, drink, warmth and shelter. These needs have to be satisfied to ensure survival, and they do not respond readily to attemps to control them voluntarily-one reason why it is so hard to diet. Some of them are cyclical (e.g. eating and sleeping) and the force with which they are felt increases and decreases in a more or less regular way. However, even these cyclical patterns are produces of complex interactions-people who eat at

regular times feel hungry if they miss a meal, whereas those who nibble all the time, or eat at irregular times, notice hunder pangs less.

Secondary Motives (such as friendship or freedom-or 'honour,power, wealth,fame and love of women' according to Freud) are acquired or learned, and the needs they satisfy may not, be indirectly related to primary motives. Earning money enables me to satisfy primary need for food and drink, but doing something creative like writing a story appears not be related to primary need. Some secondary motives are easily recognised : the need for friendship, or for independence, or being nice to someone out of guilt. Others may be outside conscious awareness, such as those things that I do to enhance or protect my self-esteem, or may be used as rationalizations for behaviour : avoiding conflict so as to keep others happy.

The inner-relationship between Primary and Secondary Motives can be assessed by reading the following table -

Primary Motives	Secondary Motives
Automatic, build-in responses	Learned responses
Physiological needs	Like a conditioned reinforcer, these activities are engaged in because they have been to primary motivations in the past
Similar to unconditioned reinforcers	Can become reinforcing on their own

Source : http://ear.berkeley.edu/psych2/lecture10/lecture10.html

Intrinsic and extrinsic Motivations :

According to the Thiagi Group (2004) -

"The idea of internal and external motivation is easy to grasp. If I do a better job because my employer offers me a bonus, I have been externally motivated. If I do a better job because it makes me proud of myself, I have been internally motivated".

According to Philip G. Zimbardo and Ann L. Weber (1994)

"Motivation to engage in an activity for its own sake, in the absence of external reward, is called **intrinsic motivation.** Things that we do because we simply enjoy doing them such as playing video games, singing in the shower, doing crossword puzzles or keeping a secret diary - are intrisically motivated. Work too, can be intrisically motivated when an individual is deeply interested in the job to be done.

Extrinsic motivation is motivation to engage in an activity for some external consequences. In intrinsic motivation behaviour is instrumental (useful) for obtaining something else. In intrinsic motivation, behaviour is carried out without a purpose

beyond the immediate rewards of doing it . Taking vitamins is extrinsically motivated; eating cream puffs is intrinsically motivated".

According to Benjamin B. Lahey (2002)

"We speak of **intrinsic motivation** when people are motivated by the inherent nature of the activity, their pleasure of mastering something new, or the natural consequences of the activity."

"Extrinsic motivation, on other hand, is motivation that is external to the activity and not an inherent part of it".

According to Richard M. Ryan and Edward L. Deci (2000) -

"Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather than for some separable consequences. When intrinsically motivated a person is moved to act for the fun or challenge entailed rather than because of external prods, pressure, or rewards.

"Extrinsic motivation is a construct that pertains whenever an activity is done in order to attain some separable outcome. Extrinsic motivation thus contrasts with intrinsic motivation, which refers to doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value".

They also pointed out that over three decades of research has shown that the quality of experience and performance can be very different when one is behaving for intrinsic versus extrinsic reasons. In an Article from the Bureau of Business Practice titled *Rev yourself Up* strategies are presented to help motivate a person (in *Motivation : A look and Intrinsic and Extrinsic Factors* by Retha Maddox, Andrew Thorn & Tomas Wilkin, Alliant International University). The article purports that motivation to change, to improve and to succeed must come from within. The following six strategies were listed ;

1. Adopt a role model; following the led of someone who has achieved the degree of success you're after can boots your self-motivation. The article suggests not changing your personality, rather examining the specific work habits, leadership style, and mental attitude that helped the role model succeed.
2. Substitute action for thought and don't dwell on the negative aspects of the job, take action and complete the tasks.
3. List potential rewards for completing tasks action.
4. Keep a visual record of your progress by creating a chart; that list minimum goals and deadlines.
5. Use sight triggers or visual motivator that symbolize the satisfaction or rewards you can expect for a job well done.

6. Set realist short-term goals.

Distiction between intrinsic and extrinsic motivations can be made by reading the following table -

	Intrinsic	Extrinsic
External		• Money • Bonus • Punishment • Praise
Internal	• When you have a passion for performing a task • When you perform a task for the sheer pleasure of it. • When you freely choose to perform a task	• Guilt • Ego Gratification • Seeing the Value of a Task

Source : creating a Motivating Environment, The Thiagi Group, 2004

However, intrinsic motivation is no panacea for employee motivation. According to Wikipedia problems are the following :

For many commercially viable activities in may not be possible to find any or enough intrinsically motivated people.

Intrinsically motivated employees need to eat, too. Other forms of compensation remain necessary.

Intrinsic motivation is easily destroyed. For instance, additional extrinsic motivation is known to have a negative impact on intrinsic motivation in many cases, perceived injustice in awarding such external incentives even more so.

Biological / Physiological Motives :

Motives that have a specific physiological basis and are necessary for survival of the organisms are called biological motives. They are hunger, thirst, body temperature regulation, avoidance of pain, and the sexual drive. However, some psychologists argued that pain , and the sexual drive should be regarded as 'mixed motives' as both physiological and learned aspects are involved in those two motives.

According to Gabriel P. Frommer (2003) -

"Biological drives or motives the motivating processes that directly affect in individual's ability to survive. They are associated with homoeostatic processes ranging from maintaining CO_2(carbon dioxide) O_2(oxygen) levels, which must be adjusted in seconds, to hunger, which can remain unsatisfied for weeks. Sexual motivation is often included as a biological drive. It is absolutely necessary for reproduction, but not survival, because it can be postponed indefinitely".

Our body's needs for growth, repair and storage of resources combine with our prior experiences and many other environmental stimuli to make us hungry. A number of physiological and environmental factors determine when we will start eating. Our hypothalamus is now thought to set our body weight. Two factors combine to cause us to stop eating. Our brain monitors how much we take in, and our stomach registers the amount of food being stored. In the longer run we are kept from eating as unknown body factors restore themselves. Thirst is similar in some ways. The hypothalamus causes us to drink, and the same mixture of factors that stops our eating also stops our drinking. An aspect of hunger which differs thirst is our ability (or inability) to maintain a healthy weight. (http://dakota.fmpdata.net/PsychAI/PrintFiles/Chptr10.pdf#search='Physiological%20Motives).

It was also said that experience with pain in the early years is important in learning how to react to pain. On the other hand physiological aspect of has both similarities with hunger and thirst, as well as differences in many ways. It is fact that hormones have an impact on humman sexual behaviour, but human sexuality tends to be dominated by environmental (learned) cues. The moral decisions pertaining to sex are very much complex in the contemporary society.

Social Motives

The social motives are learned and the process of learning is determined largely by social experience.

Henry Murray [1938] put forward the following list of basic social motives

- Achievement
- Affiliation
- Aggression
- Autonomy
- Dominance
- Nurturance
- Play
- Understanding

He also stated that people are taught to maintain a required level of the above and are learning and acquiring behavior that allows us to achieve are learned social motives.

According to him both the individual and familial influences as well as cultural and societal influences are determining the level of intensity in a person who is attempting to meet the learned social motives.

Wilf H. Ratzburg (2001) discussed 3 important social motives–

High achievement motivation

Specifically, achievement motivation is defined as a non-conscious concern for achieving excellence through individual efforts. Such individuals set challenging goals for themselves, assume personal responsibility for goal accomplishment, are highly persistent in the persuit of these goals, take calculated risks to achieve the goals, and actively collect and use information for purposes of feedback.

High power motivation

Power motivation is defined as the conern for acquiring status and having an impact on others. MeClelland used power motivation as a measure of social influence behaviors, Clearly, since most management activities require the use of social influence behaviors and since power motivation measures an individual's desire to influence, the power motive is important for leadership effectiveness.

David McClelland proposed the Leader Motive Profile Theory (LMP theory) in which he argued that a high power motivation, greater than the affiliation motive, is predictive of leader effectiveness.

Highly power-motivated individuals obtain great satisfaction from the exercise of influence. Consequently, their interest in the exercise of leadership is sustained.

High affiliation motivation

Affilative motivation is defined as a nonconscious concern for establishing, maintaining, and restoring close personal relationships with others. Individuals with high affiliative motivation tend to be non-assertive, submissive, and dependent on others.

There is another one explanation on Social Motive (http://dakota.fmpdata.net/PsychAI/PrintFiles/Chptr_10.pdf#search='Physiological%20M_otives)

Other learned motives include defendance-our need to ward off attack (whether physical or verbal) and to avoid being blamed for bad experiences of others. Affiliation is another such motive, identifying the satisfaction we derive from associating with others. This motive includes loyalty to others and likely is the basis for the maintenance of sororities and fraternities on college campuses and everything from bridge clubs

to country clubs in the broader society. Social approval is perhaps the most global motive impacting humans. We all seek and enjoy the positive regard of others.... achievement is among the strongest learned motives impacting our daily lives. ....achievement shares with other learned motives the facts that physiological processes still play an indirect, noncritical role. It is not aroused by specific physiological needs. but rather by environmental cues beyond the organism. Unlike the psysiological motives in which the urge toward specific goals such as food and water is internally motivated, satisfaction of the learned motives, including that to achieve, is largely determined by attributes of the goal.

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6.6 Review

What do we mean by the term Motivation ? How the concept of motivation is being used to understand human behaviour?

What are basic ideas behind the various theories of Motivation?

What are the types of Motivation? What is intrinsic and extrinsic motivation? Give details of biological and social motives.

Unit 7 □ Definition of Health–Physical, Mental and Spiritual Personal Hygiene, Home Sanitation, First Aid, Concept of Hygiene: Personal, Environmental and Sexual

Strucutre

7.1 Introduction

It was believed that a social worker must know what health is an that would help him/her in the task of promoting health in a given community. However, health is a broad concept which can embody different interpretations.

7.2 Definition of Health

In the fourth century B.C., Aristotle opined that health as a contributing factor to a state of thriving, flourshing, or well being (eudaimonia).

In Charaka Samhita written in the same period and commonly known as the oldest Ayurvedic writings stated that "Health is the supreme foundation of virtue, wealth, enjoyment,

and salvation. Diseases are the destroyers of health, of the good of life, and even of life itself."

Henry Sigerist (1941) stated that a healthy individual is a man who is well balanced bodily and mentally, and well adjusted to his physical and social environment. He is in full control of his physical and mental faculties. /.../ [and] contributed to the welfare of society according to his ability. Health is therefore not simply the absence of disease; it is something positive, a joyful attitude towards life, and a cheerful acceptance of the responsibilities that life puts on the individual.

According to the Preamble, Constitution of the World Health Organization (1948), "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". If further stated that "The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political, belief, economic of social condition.

Sissela Bok (2004) criticized the definition of health given by WHO and proposed alternative definitions by quoting various authors' views and writings. They are as follows–

⇒ In 1973, Daniel Challahan surveyed the many existing critiques of the definition and concluded that while some minimal level of health is required if there is to be any chance of human happiness, "once can be healthy without being in a state of "complete physical, mental, and social well-being." What would his own definition of health be? Having submitted the WHO definition to ruthless pruning, he retained only the terse statement that "Health is a state of physical well-being."

⇒ Christopher Boorse, a few years later, took further distance from the WHO definition. He eliminated the term "well-being" and rejected the view that a definition of health should include positive health. Instead, he used a biomedical definition of health as "the absence of disease," Stressing the importance of defining health as "the absence of disease," Stressing the importance of defining health in non-normative terms, he saw it as "normal functioning, where the normality is stastistical and the functions biological."

⇒ Leon Kass, in 1981, was equally dismissive of the WHO definition. "For complete mental well-being–not to speak of the more ambiguous social well-being, which will certainly men different things to Pope Paul, President Ford, and Chairman Mao–goes well beyond the province of sanity, depending as it does on the successful and satisfying exercise of intelligence, awareness, imagination, prudence. good sense, and fellow feeling, for whose cultivation medicine can do little. "31 Kass suggested three alternative definitions of health:

> Health ... is a state of being that reveals itself in activity as a standard of bodily excellence of fitness, relative to each species and to some extent to individuals, recognizable if not definable and to some extent attainable. If you prefer a more simple formulation. I would say that health is 'the well working of the organism as a whole' or again 'an activity of the living organism in accordance with its specific excellences.

⇒ In 2001, Lennart Nordenfelt, while arguing that the WHO definition had gone too far in specifying "optimal physical, mental, and social well-being." proposed an alternative definition of "complete health" that leaves out the terms "social" and "well-being", even as it provides a more flexible but correspondingly more diffuse context for the term "complete" : "A person is in a state of complete health, if and only if this person is in a physical and mental state such that he or she is able to realize all his vital goals, given a set of accepted circumstances."

⇒ Callahan, three decades after his first article on the WHO definition, reiterated his critique and stated that "By health I mean a person's experience of well-being and an integrity of body and mind, the ability to pursue his or her vital goals, and to function in ordinary social and work context. / ... / Health is no less characterized by the absence of significant pain, suffering, and harmful disease."

⇒ In a recent survey of the literature on definitions of health, Joshua Salomon an colleagues have pointed to the considerable consensus on several matters: that health is a separate concept from well-being; that any attempts to measure health must include measures of body and mind function ; and that health is an "attribute of an individual person although aggregate measures of health may be used to describe populations." If health were defined broadly as well-being. they suggest, the health system, including health ministries, would have to be seen as responsible for all areas of human activity.

⇒ Apart from critiques of the WHO definition and proposals for alternative definitions, there have been many attempts within WHO to revise the Organization's definition. As late as 1998, an effort was made to modify the rigidity of the notion of health as a state of well-being in that definition, by inserting the word "dynamic." It was also suggested that, instead of the three domains of health, a fourth should be added– "spiritual." The definition thus altered was to read : "Health is a dynamic state of complete physical, mental, spiritual and social well-being and not merely the absence of disease and infirmity." But in May 1999, a committee of the World Health Assembly wisely decided, after lengthy discussion, not to consider and proposed amendments to the WHO Constitution, Sarah Curtis (2004) stated that the bio-

medical perspective on health focuses on presence or absence of diagnosed diseases; on the other hand health can also be viewed as a socially constructed phenonmenon, having different people. Curtis further stated that people use different conceptual frameworks to understand health and often individuals work with more than one of these frameworks to understand health and often individuals work more than one of these frameworks, producing complex and variable frames of reference. According to Curtis frameworks for understanding and explaining health include :

- ↦ The idea of health as *balance*, or illness as 'imbalance';
- ↦ The notion of the body as a *machine* and of illness as 'malfunction' of the machine;
- ↦ The idea of *locus of control* (the perception of the degree of control the individual has over his or her own health);
- ↦ Health or illness seen as the outcome of *fate* or *divine will*;
- ↦ Ideas about health providing *freedom* of 'releae' to do as one pleases, or as functional ability to carry out key roles, such as work as an employee or homemaker;
- ↦ The concept of heath as *resilience* against threats of infection or hazards:
- ↦ Ideas about *access* to the means for food health, such as health care and a reasonable standard of living.

7.3 Physical, Mental and Spiritual Health

According to Jennie Naidoo and Jane Wills (1994) physical health concerns the body whereas mental health concerns the ability to think and make judgements and spiritual health is the recognition and ability to put into practice moral or religious principles or beliefs.

Good physical health means a state of well-being without any disease or illness. To achieve better physical health and maintain it once it is achieved, human beings must feed their body with nutritious foods and drinks, attend regular exercise sessions, avoid harmful behaviors and substances like taking drugs or consuming tobacco, and protect him or her from accidents.

Mental health refers to emotional , intellectual and mental states which refer ability to think and learn from experience of life, being flexible and open to new ideas, and the ability of one to question and evaluate information and thoughts and feelings. Good mental health-helps in getting awareness of and in accepting a wide range of feelings in him/her and others, expressing emotions, functioning independently and coping with the challenges of daily stressors, An individual with good mental health generally be able to make right decisions, set realistic and challenging goals in life, and be able to

handle a problem wisely.

The essential component of spiritual health is a belief that a higher power in the universe gives greater significance to individual life. People with good spiritual health identify their own basic purpose in life : learn how to experience love, joy, peace and fulfilment: and help themselves and others achieve their full potential. They concern themselves with, "giving, forgiving and attending to others' needs before one's own needs." Roger Smith, Michigan State University (http:/www.msjc.edu/hs/www/ health overview.htm).

7.4 Concept of Hygiene

Hygiene is a science of the establishment and maintenance of health and conditions of practices (as of cleanliness) conducive to health (Merriam-Webster Online Dictionary).

Hygiene is the science of preventive medicine and the preservation of health. The word hygiene came from the name of Hygeia, the daughter of Asklepios, the Greek god of medicine (whose staff with entwined snake is the symbol of medicine). Asklepios (known to the Romans as Aesculapius) had a number of children including not only Hygeia but also Panaceia, the patroness of clinical medicine. Hygeia also followed her farther into medicine. As the patroness of health, hygeia was charged with providing a healthy environment to prevent illness. In Greek, "hygieia" means health (http://www.medterms.com/ script/main/art.asp?articlekey=7324).

Wikipedia gave following points about hygiene–

⇒ Hygiene is the maintenance of healthy practices. In modern terminology, this is usually regarded as a particular reference to cleanliness.

⇒ Outward signs of good hygiene include the absence of visible dirt (including dust and stains on clothing) or of bad smells. Since the development of the germ theory of disease, hygiene has come to mean any practice leading to the absence of harmful levels of bacteria.

⇒ Good hygiene is an aid to health, beauty, comfort, and social interactions. It directly aids in disease prevention and/or disease isolation. (That is, good hygiene will help keep you healthy and thus avoid illness. If you are sick, good hygiene can reduce your contagiousness to others.)

7.5 Personal Hygiene

It is a fact that good health has direct link with the personal hygiene, environmental

cleanliness, life style and health practices. Guy Howard et al (2002) stated that personal hygiene is essential for improving health. For example, if injuries and minor cuts are not kept clean, they may become infected and lead to further health problems. And even though water supplies and sanitation facilities may be constructed in a community, unless people use these facilities properly and wash their hands after defecation, store water safely, bathe, and clean clothes and utensils properly, diseases caused by poor water and sanitation still exist.

Regular hand-washing is necessary to prevent the spread of infectious diseases. There are five ways diseases are transmitted by contaminated hands.

⇒ Hand to food

⇒ Infected hands to other hands

⇒ Food to hands to ready-to-eat food

⇒ Nose, mouth, or eyes to hands

⇒ Food to hands to person

Hence human beings should trimmed their nails regularly and washed their hands with soap and water after defecting, after cleaning a child who has defecated and before eating or handling food.

Regular bathing and laundering is necessary to prevent hygiene -related diseases like scabies, ringworm, trachoma (an illness that can cause blindness and other eyesight problems), conjunctivitis, etc.

Due to poor hygiene of teeth and mouth cavity in the tooth occurs. Foul breadth is sometimes the end result of the same. Brushing the teeth twice daily is needed to keep the teeth clean and gums healthy.

7.6 Environmental Hygiene

Environmental hygiene includes water source protection, proper disposal of solid waste and excreta, wastewater drainage, controlling animal rearing and market hygiene. Every individual in a given community can play an important role in environmental hygiene and have a responsibility to keep the environment clean.

UNDP and WHO (1994) prepared golden rules for safe water. Some of them are as follow–

⇒ No one should defecate or urinate near or in a source of drinking of bathing water;

⇒ Keep animals aways from water collection areas;

⇒ Water for drinking must always be boiled or chlorinated, covered against flies and dust. Germs causing diarrhoea will be killed or inactivated when water begins boiling

rapidly, or when it is chlorinated. If the water is very cloudly it should be filtered before chlorination.

⇒ Keep drinking water in as clean container. Be sure hands do not touch the water inside. Cover the container to keep water free from insects and dust. Clean the container and change the water regularly.

Storage of household garbage, dirt materials, dusts etc. in and around the household may be the breeding ground of flies and mosquitoes. Open drains, puddles of water in the streets, collection of cow dung, and kitchen waste are also regarded as dangerous for environmental hygiene.

7.7 Sexual Hygiene

Sexual hygiene is a presentation of the laws of sexual right-living. It is a branch of hygiene concerned with sexual behavior as they relate to individual and community well-being (*Random House Unabridged Dictionary*).

Good sexual hygiene includes :

- Always wiping from front to back after a defecating or urinating.
- Keep the skin around and between the rectum and vagina clean by washing with soap and water at least once daily. However, too much soap may irritate the sensitive skin.
- Women who wash both before and after sexual intercourse may lower their risk, of developing a urinary tract infection.
- Change the undergarments regularly.
- Keep the pubic hair short.
- After urinating one should cleaned the fore skin by pulling it.
- In the time of menstruation only a clean, washed and sun-dried cloth should be used if disposable sanitary napkins are not available.

7.8 Home Sanitation

According to Brian Appleton and Dr. Christine van Wijk health benefits form home sanitation facilities are as follows.

⇒ 36% reduction in incidence of diarrhoea from improved excreata disposal :

⇒ 30% reduction in incidence of diarrhoea in children (3-36 months) in households with flush toilets ;

⇒ 15% in incidence of diarrhoea in children (3-36 months) in housholds with pit latrines ;

⇒ 40% reduction of children with stunted growth in households with flush toilets.

⇒ 26% reduction of children with stunted growth in households with pit latrines ;

⇒ Among illiterate mothers, a 7-fold larger reduction in child mortality than with a better water supply.

Jan Davis et al. remarked that where there is no improved from the sanitation, many people practice what has been called; open-field defecation. Custom may dictate location and the areas which men and women use. Children may defecate in or near the household yard. Some of these traditional sanitation practices are uncontrolled and can pose serious health risks. Improved sanitation aims to contain and safely dispose of human excreta.

Defecating in open places spreads harmful germs which intern causes diseases. Open defecation is the major cause of hookworm and round worms in the children. as the larvae of these worms get mingle with the soil and enter through the sole of the foot while walking bare-footed. Hence every household should have a sanitary latrine. Government of India is porviding support to the households in need to build sanitary units in their respective households with low cost through Total Sanitation Compaign. Local Panchayat Samity and Sanitary Mart should be contacted for construction of latrine.

Privacy is another important reason to promote home sanitation. Generally women in the villages are waiting for the darkness to defecate in order not to be seen by others causes health problems. In the time of pregnancy and menstruation they also face difficulty to go out in the fields to defecate. Having a home sanitary facility is convenient to all the family members in general and women children and older persons in particular.

7.9 First Aid

First aid is the immediate and temporary aid provided to a sick or injurned person until medical treatment can be provided. It generally consists of series of simple, life saving medical techniques that a non-doctor or lay person can be trained to perform with minimal equipment (Wikipedia).

The following details will help the students to provide basic first aid in the time of emergency (on the basis of http://www.wholesale-direct-first-aid.com/Scripts/page.asp/idpage=20).

7.10 Bleeding

⇒ Keep victim lying down.

⇒ Apply direct pressure using a clean cloth or sterile dressing directly on the wound.

⇒ Once bleeding is controlled, keep victim warm by covering with a blanket, continuing to monitor for shock,

⇒ Wash your hands and cleanse the injured area with clean soap and water, then blot dry

⇒ Apply antibiotic ointment to minor wound and cover with a sterile gauze dressing or bandage that is slightly larger than the acutal wound.

7.11 Eye Injuries

⇒ Cover both eyes with sterile dressings or eye cups to immobilize.

⇒ Covering both eyes will minimize the movement of the injured eye.

⇒ DO NOT rub or apply pressure, ice, or raw meat to the injured eye.

⇒ If the injury is a black eye, you may apply ice to check and area around eye, but not on the eyeball itself.

7.12 Burns

First Degree Burn : Skin will appear red and may be swollen or painful. Generally does not require medical attention.

Second Degree Burn : Skin will appear red, blistered and swollen. May require medical attention.

Third Degree Burn : Skin will be visibly charred and may be white. Usually very painful. REQUIRES MEDICAL ATTENTION.

Submerge burn area immediately in cool water until pain stops. If affected area is large, cover with cool wet cloths. Do not break blisters if they are present. If pain persists but no medical assistance is needed, apply medicated first aid cream or gel and cover with sterile dressing. If medical attention is needed, do not apply any cream. Just cover with a dry, sterile dressing and seek medical help immediately.

7.13 Drowning

⇒ Just squeeze the chest and abdomen of the person who are lying face down, in a periodic manner.

⇒ Perform mouth to mouth breathing keeping an eye on the chest movement of the person.

⇒ Use the right hand on the top of the left (for left handed person just opposite) to message the heart-it is slightly to the left of the mid-line. Give heart message 40-60 times in a minute but not more than that.

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7.15 Review Questions

1. What do we mean by health? Give definition of health.
2. What do we mean by hygiene? Discuss about personal, environmental and sexual hygiene.
3. What are the importances of home sanitation in a village life?
4. Write a brief note on first aid services could be provided in the time of emergency.

Unit 8 □ Reproductive and Child Health: Antenatal and Postnatal Care and Child Rearing Practices

Strucutre

8.1 Introduction

In 1994, the International Conference on Population and Development (ICPD) was held at Cairo, Egypt. The ICPD was participated by the government delegations from 179 countries and myriad representatives of civil society and they at this conference came to an unprecedented consensus on a 20-year Programme of Action (POA) to stabilize the world's population by investing in people and better meeting their holistic health and development needs. The programme of action ratified at ICPD asserts the interdependence of population and development, and calls for the empowerment of women both as a matter of social justice and as the key to improving the quality of life for people (Catino, 1999). ICPD was instrumental in bringing a paradigm shift from age-old maternal and child health care and family planning programme to a comprehensive approach of reproductive health based on the lifecycle approach in which focus would be on both men and women's lifetime concerns (from birth to old-age) and not limited to the need of women in reproductive age group. Being an integrated approach reproductive health roped into the following components.

⇒ Safe motherhood consisting of antenatal, safe delivery, essential obstetric care, neonatal care and exclusive breastfeeding.

⇒ Family planning services and information

⇒ Services and information for the adolescents for promotion of healthy sexual maturation, gender equality, and responsible and safe sex practices among them

⇒ Provision of safe abortion services and prevention and management of abortion related complications.

⇒ Prevention and management of infertility and sexual dysfunction

⇒ Prevention and management of reproductive tract infections (RTIs) including sexually transmitted infections (STIs) and HIV/AIDS

⇒ Elimination of harmful practices like early marriage and domestic and sexual violence.

⇒ Management of non-infections conditions of reproductive system like problems related to menopause, genital fistula, cervical concer, etc.

The Programme of Action of ICPD gave the following definition of reproductive health :

"Reproductive health is a state of complete physical, mental and social wellbeing ... in all matters related to the reproductive system and to its function and processes. Reproductive heath therefore implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when, and how often to do so. Implicit in this last condition are the rights of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice ... and the right of access to appropriate health care services that will enable women to go safely through pregnancy and childbirth (ICPD, 7.2)

If we read the last line of the definition–"... *the right of access to appropriate health care services that will enable women to go safely through pregnancy and childbirth"* then the central role of safe motherhood interventions in reproductive health will be evident.

Now the question is what is safe motherhood? The Possible answer will be a pregnant woman remains healthy and safe throughout pregnancy and gives birth to normal and healthy newborn; and gets protection from complications during pregnancy, delivery and postnatal period and the newborn gets required care after birth.

Here it is worthwhile to mention the sex major causes of maternal death, which is largely avoidable, to understand importance of care during antenatal, natal and postpartum period–

⇒ Excessive bleeding during antenatal, natal and postnatal period.

⇒ Eclampsia-convulsions occur flowing hight blood pressure with presence of swelling on feet and face and passage of proteins in urine

⇒ Prolonged and obstructed labour

⇒ Sepsis-infections in severe condition in the uterus

⇒ Unsafe abortion

⇒ Presence of anemia and malaria

In every five minutes 1 woman in India dies from complications related to pregnancey and childbirth and in every year over 100,000 women die due to the same cause. The causes of maternal mortality are deeply rooted in the adverse social, cultural, political and economic environment of society and especially the environment that society creates for women (Anne Starrs, 1987)

8.2 Antenatal Care

Antenatal care is the care for pregnant women before childbirth, The major objectives of antenatal care are the following:

⇒ To have a contact with the pregnant women

⇒ To promote , protect and maintain the health of the pregnant women and the unborn baby

⇒ To identify and manage current and potential risks and problems.

⇒ To counsel the pregnant mother to provide emotional support and to reduce anxiety associated with delivery

⇒ To disseminate information on self-care during pregnancy and after child birth, nutrition, personal hygiene, danger signs, family planning options after child birth and environmental sanitation

⇒ To reduce maternal and infant mortality

***Signs of pregnancy in early stage* (0-13 *weeks*)**

⇒ A missed period

⇒ Loss of appetite, nausea or vomiting commonly experience on rising in the morning or in the evening

⇒ Frequent urination

⇒ Increased sleepiness

⇒ Enlargement of breasts with darkening of the nipples

⇒ Swelling, tenderness, or tingling in the breasts

***Signs of pregnancy in mid-term stage* (14-27 *weeks*)**

⇒ Enlarged abdomen and palpable uterus

⇒ Feeling of fetal movements

Signs of pregnancy in the last stage

⇒ Uterus become very enlarged in size.

⇒ Feeling of fetal parts and movements
⇒ Fetus becomes capable for independent existence
⇒ Milk-secretion in the breasts
⇒ Frequent urination
⇒ Problems in sleeping and walking

Common discomforts and how to deal with them :

Discomforts	Remedy
Morning sickness or nausea/vomiting	Eat light meals frequently Avoid oily and spicy foods Eating snacks before going to sleep at night and before rising in the morning Take half a teaspoon of amla jam on an empty stomach
Heartburn	Eat light meals frequently Taking chewable antacid tablets Wear loose clothes Avoid oily and spicy foods Do not lie down immediately after taking a meal
Constipation	Eat fruits, vegetables and whole grains as much as possible Drink plenty of water
Frequent Urination	Drink plenty of water If unination with burning sensation consult doctor.
Backache	Daily Walk in morning and/or evening Avoid lifting heavy loads Messages on the back
Shortness of Breath	Walk slowly Take rest frequently Sleep with the hand slightly raised on pillow.

Periodic medical checkups :

A health care provider must examine the pregnant women 3 times during antenatal period-first during 3 months, second after 6 months and last at the onset of ninth month. However, if the pregnant women has any problem or is in risk she then has to visit the health care facility as advised by the health care personnel. In each visit medical check up of blood, urine and blood should be conducted and weight should be measured. All pregnant women are also advised to register their names with ANM in the sub-centers or in other health facilities as soon as she becomes pregnant. During the visits 100 IFA tablets and two injections of TT must also be given to the pregnant women.

Nutrition during antenatal period :

⇒ Eat approximately one-and-half times the quantity of food she ate usually when she was not pregnant.

⇒ Eat a balanced diet comprising of beans, nuts, starchy food (like potatoes, rice, cereals etc.), bread, meat, milk, ghee, eggs, fish, curds, pulses, green peas, soyabeans, oil, butter, and fruits like papaya, mangoes, guavas and vegetables like carrots, cabbage, etc.

⇒ The diet must consist of locally available food including food rich in

Iron : red meat, eggs, dark green vegetables like kulekhara leafs, lentils, peanuts etc.

Vitamin A : milk products, eggs, carrots, papaya etc.

Calcium : milk, dark geen leafy vegetables, beans, lentils etc.

Vitamin C : oranges or other citrus fruits, tomatoes, etc.

⇒ Eat light and more frequent meals for good digestion

⇒ Should not fast throughout pregnancy

Care of teeth :

As pregnancy progresses the women are feeling swelling of gums. Routine dental care supported by adequate intake of calcium containing diet may help in addressing the problem.

Exercise :

The kind and amount of exercise needed should depend on the type of work performed by the pregnant woman. Manual workers like construction workers, agrarian labours who are performing heavy works should lighten their workload as pregnancy advances. On the other hand housewives may need moderate kind of exerceise in open air like taking a walk every day that helps them stay healthy and feel good. But women, who have little or no tasks to perform, should exercise daily.

Rest :

⇒ Avoid heavy physical labour like lifting and carrying heavy loads, walking for hours and hours, digging up, etc.

⇒ Pregnant women should avoid sitting or standing for a long period

⇒ Decrease the amount of heavy works and increase rest time. Lie down for an hour minimum during the day time and sleep of 6-10 hours every night

⇒ Take every opportunity to have rest and must learn how to relax

⇒ The best position of having rest for pregnant women is lying on her left side with her feet elevated.

Emotional support :

⇒ Family members in genreal and husband in particular must understand the emotional changes may occur during pregnancy and thereby support the pregnant women by providing her assurance that this a natural happening.

⇒ Provide love and kindness to support the pregnant women to overcome stressful period.

⇒ Help the pregnant women to talk about her feeling in order to help them not to be anxious and fearful.

Sexual relation during pregnancy :

⇒ Decrease and increase of sexual desire among women is normal during pregnancy.

⇒ Intercourse is not harmful both for the women and th fetus when pregnancy is progressing normally. But intercourse should be avoid if the women experience leaking watery fluid, vaginal bleeding and signs of premature labour. In addition intercourse in late pregnancy is uncomfortable.

⇒ Sexual intercourse with pregnant women with a previous history of miscarriage is not advisable. Avoid intercourse during first three months are also suggested.

⇒ To satisfy sexual need of both woman and man changes in the sexual position if needed to-accommodate the enlarge abodomen of the pregnant woman.

⇒ Sexual practices like anal sex should be avoidded to prevent infection as transmission of STI during pregnancy is dangerous to woman, her sexual partner /husband and the unborn baby.

Personal hygiene :

⇒ Bathing regularly

⇒ Regular cleaning of genitals.

⇒ Clean the breasts an message and pull the nipples slowly upward everyday if the nipples are small and inverted.

⇒ Use clean and running water and gentle soap in cleaning genitals and breasts

⇒ Clean mouth and teeth regularly to prevent infections

⇒ Washed and combed hair regularly

⇒ Changing and cleaning of the bedcover regularly.

Weight gain :

⇒ Pregnant women generally gain 1-1.5 kg of weight every month.

⇒ Total weight gain in nine month is vary between 10-12 kgs.

⇒ Less weight gain is an alarming sign as it indicating that fetal growth may not be normal

Use of potentially Harmful Substances :

⇒ Alcohol and smoking are harmful to a pregnant woman and her unborn baby

⇒ Inform the doctor/health worker before taking any medicine during pregnancy

High Risk Pregnancy :

⇒ Pregnant women under 18 years old or over 35 years old

⇒ Last pregnancy less than 2 years ago

⇒ Pregnant mothers with less 45 kg weight and 145 cm height

⇒ Pregnant women with anemia and malaria

⇒ Pregnant women with hypertension, diabetes, jaundice, heart and lung problems

⇒ Pregnant women with a history of two or more previous abortions,/ still births/ low birth weight baby

⇒ Pregnant mother who have 4 or more previous pregnancies.

⇒ Pregnant women with a history of previous difficult/premature/caesarian birth

Danger Signs in Antenatal Period :

Following danger signs required medical help–

⇒ Vaginal bleeding

⇒ Severe vomiting

⇒ Swelling over face, ankles or fingers

⇒ Breathing difficulty

⇒ High fever

⇒ Blurrded vision and/or severe headache

⇒ Severe abdominal pain

⇒ Convulsions/loss of consciousness

⇒ Pale eyelids, tongue or palms and feeling of tiredness

⇒ Discharge of greenish/brownish fluid from the vagina

⇒ Too much increase in the size of the body or too little increase in the body size especially abdomen

Must Do :

⇒ Take two Tetanus Toxoid injections to protect women and the newborn form tetanus.

⇒ To prevent anemia take 100 IFA tablets.

8.3 Child Birth

Ideally all the delivery should take place in the medical facilities as in case of any problem medical help can be sought immediately. However, if delivery in medical facility is not possible then following arrangements can be made at home so that delivery can take place in the presence of trained dais or trained health workers.

⇒ The delivery room should be a clean and open place where fresh air is available in plenty.

⇒ Having a home delivery kit ready with a cake of soap, a clean new an unopened blade, a clean thread to tie the cord, a clean bed or plastic sheet, washed and sun dried cotton clothes for both mother and the baby.

⇒ Maintenance of FIVE CLEANS : Clean delivery surface : Clean hand : Clean thread; Clean blade and Clean cord-stamp.

Danger signs during child birth requiring medical attention :

⇒ Premature rapture of membranes–the bag of water breaks too early with sluggish pain or no pain or contraction

⇒ Bleeding from vagina

⇒ Obstructed labour–when baby is too big to pass through the birth canal.

⇒ Prolonged labour–when labour continues for many hours without making any progress towards the delivery because of weak uterine contractions, an abnormal position of the baby or obstructed labour.

⇒ Eclampsia (cause fits, convulsions and faintness)

⇒ Placenta not separated within half an hour after delivery.

8.4 Postnatal Care

The Postnatal period begins after delivery of the newborn and extends up to six weeks after that. In this period women's reproductive organs gradually return to their normal shape and size.

Rest :

⇒ Plenty of rest is necessary for the women in postpartum period to regain her strength and recover more quickly.

⇒ Advice to take periodic rest at the day time when the newborn is sleeping as women are breastfeeding and her sleep at night will be interrupted.

⇒ Encourage woman to start back into her daily work/job gradually but keeping an eye on her body for signs that she may be overdoing it or may need more rest.

Diet :

⇒ Women who are breastfeeding should eat more body-building foods like beans, pulses, milk, eggs, meat ; calcium-reach foods like dark green leafy vegetables, rice; drink variety of fluids like milk, water and juices.

⇒ Avoid alcohol and tobacco which can decrease the milk production

⇒ If possible drink a glass of fluid after breastfeeding every time

⇒ May take 1 mg of folic acid daily and 300 mg of iron sulphate three times a day to meet more need of iron and folic acid at this period

Exercise :

⇒ To regain abdominal tone exercise of abdominal muscles in the first few weeks is needed

⇒ For first 40 days no strenuous exercise should be allowed

⇒ Specific postpartum exercises may be started after thoroughly recovering from the delivery. These exercises should be done for 15-20 minutes not more than that.

⇒ No exercises should be tiring and difficult.

Health Check up :

A health check up within 7-10 days of the delivery is a must

Personal Hygiene :

In this period women are prone to infections hence, following hygiene should be maintained ;

⇒ Living in a clean room with fresh air and sunshine

⇒ Clean bed and clean and regularly washed and sun-dried bed-sheets

⇒ Clean, washed and sun-dried clothes

⇒ Daily bath, and cleaning of genitals and breasts.

Danger signs in the postpartum period :

⇒ Heavy or sudden increase of vaginal bleeding with a bad smell

⇒ Fever

⇒ Severe abdominal pain

⇒ Severe headache/blurred vision

⇒ Pain in calf with or without swelling

⇒ Vomiting or diarrhoea

⇒ Fits, convulsions or fainting attacks
⇒ Breathing difficulty

Sexual relations

⇒ Avoid having sexual intercourse for a minimum period of 2 weeks after birth
⇒ Intercourse should be avoided if there is vaginal bleeding and perineal pain.

Common problems and their management :

⇒ Infrequent low abdominal pain-provide mild analgesic and give reassurance
⇒ Retention of Urine:- hot and cold water application, and sometimes sound of running water helps
⇒ Engorgement of breasts–hot water fomentation and light message from periphery towards nipple helps in removing engorgement.

8.5 Child rearing practices

Maintaining Warmth :

⇒ The delivery room should be made comfortably warm during the time of winter
⇒ The mother and the newborn should lie down together with skin-to-skin touch, covered with a clean, washed and sun-dried blanket for at least first 6 hours.
⇒ The baby must be received at birth at in a cotton, clean, sun-dried, washed warm cloth
⇒ Do not bath the baby at least for 6 hours after birth and preferably not in the first 24 hours and until the temperature of baby is stable, but wipe his/her body with a clean cloth beginning with the head.

Newborn Danger signs :

⇒ Diarrhoea
⇒ Jaundice
⇒ Convulsions, loss of consciousness
⇒ Spasms
⇒ Fever or cold to touch
⇒ Back arching
⇒ Bleeding
⇒ Severe vomiting
⇒ Abdominal distention
⇒ Feeding difficulties
⇒ Redness of eyes or skin
⇒ Floppiness

⇒ Pallor

Exclusive Breastfeeding

⇒ The child should be put to breast as soon as possible after birth as early sucking leads to early and free flow of milk,

⇒ Give the colostrums (first yellowish milk) to the newborn as it enhances the immunity power among the baby.

⇒ Advice women to breastfeed her baby exclusively for at least 4 months of life. Exclusive breastfeeding means no water, juice, formula, rice or any other drink or food to be given to the baby; only breast milk will be given.

⇒ Baby should have 8-12 times breastfeeding in a day (every 2-3 hours) during first weeks of life.

⇒ Baby should be breastfed on demand.

⇒ If baby is getting enough to eat, he or she urinates at least 6 times per day during the first 2-7 days.

⇒ Mother should use both breasts, feeding her baby from one until it has nothing and then putting the other in the mouth of the newborn

⇒ During breastfeeding check that the nostrils of the newborn are open

⇒ Newborns need frequent and short feeding

⇒ Show mother how to put areola in a right way in the mouth of the newborn

Benefits of Breastfeedings :

Breastfeeding/breast milk

⇒ Provides the best nutrition for the newborn

⇒ Easy to digest

⇒ Contains antibodies that protect newborn from various types of infections in general and diarrhoea and respiratory infections in particular

⇒ Offers some protection against allergies

⇒ Cost-effective and affordable

⇒ Provides the woman contraceptive protection as long as she is exclusively breastfeeding.

⇒ Promotes mother-newborn bonding

Sleep:

Babies generally sleep about 16-20 hours per day and wake up only for feeding. However, after I week baby starts to stay awake more during day time and sleep longer period in night.

Growth Monitoring :

Monitoring the growth of the child is being done through the regular measurement of weight (and sometimes length) of the child. Weighing starts immediate after the delivery of newborn and continues until the child is five years old. Ideally the child weight should be taken on a monthly basis until the age of two years and then three times in a month until the child is five years old. Standard growth curves, which are shown in the growth chart, have been defined after measuring thousand children. Any child weighing less than 80% of the average weight of his/her age is termed as malnourished whereas weighing less than 60% of average weight of his/her weight is severely malnourished.

Immunization schedule :

Vaccine and Dosage	Diseases Covered	Age
BCG-1 Dose	Tuberculosis	Soon after the birth
Polio-0 Dose DPT-1ST Dose	Polio Diphtheria, Whooping cough and Tetanus	Do 6 Weeks
OPV -1st	Polio	6 Weeks
DPT-2nd Dose	Diphtheria, Whooping cough and Tetanus	10 Weeks
OPV -2nd Dose	Polio	10 Weeks
DPT-3rd Dose	Diphtheria, Whooping cough and Tetanus	14 Weeks
OPV -2nd Dose	Polio	10 Weeks
Measles-1 Dose	Measles	9 months
Vitamin-A Prophylaxis-1st	Night Blindness	9 months
DPT-1^{str} Booster		At 16-24 months
OPV-1st Booser		Do
DT-2nd Booster	Diphtheria and Tetanus	5-6 years
TT-2nd Dose	Tetanus	10 years and 16 years

8.6 References

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8.7 Review Questions

1. What is reproductive health? What are the major components of Reproductive health?
2. Write a short note on antenatal, postnatal and child rearing practices.

Unit 9 ◘ Symptoms,Causes, Control and Prevention of TB, VD, AIDS, Cancer, Hepatitis B, Malaria, Diarrhoea, Leprosy

Structure

9.1 Introduction

In the contemporary society social workers are increasingly being challenged to meet the health needs of the world's poor and to address the threats of various dreaded diseases. Hence a working knowledge on non-communicable as well as communicable diseases will be helpful for them to respond to the health needs of a given community in the most appropriate way.

9.2 TB

TB infection is a state in which the Mycobacterium tuberculosis (or bovis, etc.) has established itself in the body, without symptoms of evidence, in contrast to TB disease, where there are symptoms and signs of damage to one or more organs (Wilks et al. 2003.)

TB is one of the major health problems in our country. According to the estimate made by Ministry of Health and Family Welfare, Government of India, every year in India, about 500,000 people needlessly die of this preventable disease. This means 1000 every day and nearly one person every minute.

Symptoms

(Symptoms of TB in Adults over 15 years of age)

⇒ Cough for more than 3 weeks especially if the cough brings up mucus (sputum) from the lungs;

⇒ Significant weight loss

⇒ loss of appetite

⇒ Low grade fever especially in the evening

⇒ Chest pain

⇒ Breathlessness

⇒ Tiredness

⇒ Blood in the Sputum

(Symptoms of TB in Young Children)

⇒ Painless lymph node enlargement in the neck region (it may sometimes burst)

⇒ Weight loss or abnormally slow growth

⇒ No or little response to antibiotic therapy

⇒ Loss of energy

⇒ Persistent deep seated cough

⇒ Low grade fever

⇒ Fatigue

⇒ Increasing irritability and drowsiness over 2 Weeks.

Causes:

Most of the TB is transmitted by inhalation of M. tuberculosis bacilli in droplet nuclei. These nuclei derieve from humans with pulmonary or laryngeal TB, predominantly by coughing, although sneezing, singing and prolonged talking may contribute. Such nuclei may remain suspended in air for long periods. The risk of transmission depends upon the amount of bacilli in the sputum, the nature of the cough, the closeness and duration of the interaction and susceptibility of the contact (J. Hawker et al. 2001).

Control and Prevention

⇒ Under the national immunization activities BCG vaccine is being given to all children which protect them getting infected from sever forms of extra-pulmonary TB in children under five of age. But remember the vaccine does not prevent TB in the adult period.

⇒ Ensuring early detection and treatment of TB cases. The diagnosis and cure of infectious cases of TB is the most effective method of preventing the transmission of TB.

⇒ Strengthen the immune system by ensuring nutritive food, enough rest, and fresh air, and proper ventiation in the room in which people are living.

⇒ Discourage people in spiting anywhere especially in public places.

9.3 VD (Venereal Disease)

A disease that is contracted and transmitted by sexual contact, caused by microorganisms that survive on the skin or mucus membranes, or that are transmitted via semen, vaginal secretions, or blood during intercourse. Because the genital areas provide a moist, warm environment that is especially conducive to the proliferation of bacteria, viruses, and yeasts, a great many diseases can be transmitted this way, They include AIDS, chlamydia, genital warts, gonorrhea, syphilis, yeast infections, and some forms of hepatitis. Also known as a morbus venereus of sexually transmitted idsease (STD) (http://www.medterms.com/script/main/art.asp?articlekey=11545).

Sumptoms:

⇒ Burning sensation when urinating or defecating, increased frequency of urinaion

⇒ Blisters around the vagina

⇒ Itching in the genital areas

⇒ Penile discharge

⇒ Warts in the genital parts

⇒ Sore throat, swollen and painful glands in the groin

⇒ Flu-like symptoms

Symptoms only in owmen

⇒ Unusual vaginal discharge

⇒ Blisters around the vagina

⇒ Lower abdominal pain and painful sexual intercourse

⇒ Itching in the genital areas

Symptoms only in Men

A drip or discharge from the penis

Here is a brief comparative analysis of the symptoms of severn of these STDs (As stated in http://www.pathlights.com/ne_encylopedia/15std01.htm)

Chlamydia : In women–a burning sensation when urinating. A white vaginal discharge resembling cottage cheese. Itching, painful intercourse. In men– a clear, watery, urethral discharge. But often no symptoms at all.

Genital Herpes: Itching and burning in the genital area. Discomfort when urinating. A watery vaginal or urethral discharge. Fluid -filled, weeping , eruptions in the vagina or on the penis.

Genital Warts : Single or clustered, soft, califlower-like growths in and around the vagina, anus, penis, groin, and/or scrotal area.

Pelvic Inflammatory Disease (PID) : Fever and lower abdominal pain. A pus-filled vaginal discharge.

Trichomoniasis : In women– a foamy, greenish or yellow, foul -smelling vaginal discharge, vaginal itching, and pain. In men–a clear urethral discharge.

Syphilis : a sore on the genitals ; accompanied by rash, fever, patches of flaking tissue ; sore throat; and sores in the mouth of anus.

Gonorrhea : In women–a cloudy vaginal discharge, frequent and painful urination. vaginal itching. Inflammation of the pelvic area, rectal discharge, and abnormal uterine bleeding. In men–a pus-filled, yellowish, discharge. Often there are no symptoms for months. In women there may never be symptoms, yet all the while they are infecting men.

Causes :

⇒ Unprotected sex with infected partner

⇒ Various types of infective organisms like viruses, bacteria etc. cause them

Control and Prevention

⇒ Ensuring early-detection and treatment of STD cases. The diagnosis and cure of STD causes is the most effective method of preventing the transmission of VD.

⇒ Safe sex and use of condoms are the most effective way to prevent STD.

⇒ Dissemination of information that most STDs can be treated and cured and signs and symptoms of VD lead to the prevention of the same.

9.4 AIDS

AIDS stands for the Acquired Immune Deficiency Syndrome. It is caused by the Human Immuno-deficiency Virus (HIV). HIV weakens the human immune system which is the natural defenses against disease-causing organisms and due to this infections develop which are called 'opportunistic infections'. HIV infection is very dangerous as it may live in our body for years and can be transmitted to others before and symptoms appear.

UNESCO PROAP and SEAMEO TROPMED (2000) defined AIDS in the following way–

Acquired

means that is the result of contact with a source external to the person, such as sexual partners.

Immune

means the body's natural defense system which provides protection from disease-causing organisms.

Deficiency

describes the lack of response by the immune system to organisms that impair the body's ability to protect itself against disease.

Syndrome

means a group of signs of symptoms which result from a common cause or appear in combination and presenting as clinical manifestation of a disease.

Here it may be noted that 'HIV positive' means a person with HIV infection whereas full-blown AIDS characterized by life-threatening opportunistic infections an neoplasms. The average period form infections with HIV to development of AIDS is seven to nine years.

Symptoms :

⇒ Continuous weight loss

⇒ Shortness of breath

⇒ 30 days or more of either diarrhoea or weakness with fever

⇒ Headaches

⇒ Difficulty swallowing

⇒ A thick, whitish coating of the tongue or mouth (thrush) that is caused by a yeast infection and sometimes accompanied by a sore throat.

⇒ Reddish, brownish or purple spots on the mouth or skin and recurring or unusual skin rashes

⇒ Periods of continued, deep, dry coughing

⇒ Repeated vaginal infections

⇒ Swollen lymph nodes in armpits, neck or groin

Causes :

HIV can be transmitted through

⇒ Unprotected (without using condom) sexual intercourse with a HIV positive person. Both heterosexual and homosexual contact is dangerous. The virus can be transmitted through minor cuts in the body, ulcers in the penis or vagina or sores in the lining

of the vagina, vulva penis rectum, or mouth during anal, vaginal, or oral sex. It is fact that the risk of transmission of HIV increased 5-10 times if there is presence of STIs like gonorrhoea, syphilis, chancroid etc.

⇒ Sharing of contaminated injection needles or syringes.

⇒ Transfusion of infected blood or blood component

⇒ From infected mother to baby in the womb. In the absence of any interventions, about one third of babies born to HIV-infected women will become infected before birth, at birth or through breastfeeding.

Control and Prevention

J. Hawker et al suggested some preventive measures to stop the spread of HIV/AIDS. They are noted below–

⇒ Sexual tranmission can be reduced by promoting sexual abstinence or completely monogamous relationships between two uninfected partners or by reducing the number of sexual partners and minimizing exposure to body fluids during intercourse by using latex condoms.

⇒ Services for diagnosing and treating sexuallytransmitted infections including voluntary confidential testing for HIV infection and HIV counselling,.

⇒ Transmission among intravenous drug users can be reduced by appropriate educational efforts and treatment programs.

⇒ Perinatal transmission can be reduced by counselling and testing for HIV infection for all pregnant women as a routine part of antenatal care combined with interventions to reduce the risk of vertical transmission from mother to infant including antiviral treatment.

⇒ Healthcare workers and others should be advised to take particular care when handling blood or sharp instruments to adopt universal precautions for the prevention of blood-borne viral infections when caring for any patient with HIV infection.

Two more important preventive measures are as follows–

⇒ Collect blood from the registered blood banks and see the note that the blood is HIV free.

⇒ Promotion or awareness and dissemination of information and using of behavious change communication methodology.

9.5 Cancer

Cancer is a class of disease or disorders characterized by uncontrolled division of

cells and the ability of these cells to invade other tissues, either by direct growth into adjacent tissue through invasion or by implantation into distant sites by metastasis. This unregulated growth is caused by damage to DNA, resulting in mutations to genes that control cell division. Several mutations may be required to transform a normal cell into a malignant cell. These mutations occur spontaneously, or they can be inherited as germ mutations, (Wikipedia)

Symptoms :

⇒ Fever, persistent fatigue, or rapid weight loss

⇒ Skin changes such as jaundice, darkening of the skin, abnormal hair growth, reddening, and skin itchiness

⇒ Loss of appetite

⇒ Unusual lumps or swelling

⇒ Night sweats

⇒ Unusual bleeding form gums, nostrils, lungs, rectum, bladder, vagina

⇒ Blood in the urine

⇒ Blood in spit

⇒ Anemia

⇒ Pain in the bone

⇒ Nausea, vomiting, Constipation, problems with urination

⇒ Dizziness ; drowsiness ; abnormal eye movements or changes in vision

⇒ A lump or thickening of the breast; discharge from the nipple.

⇒ Wheezing, persistent cough for months

⇒ A lump in the mouth, ulceration of the lip, tongue or inside of the mouth that does not heal within a couple of weeks.

The above stated symptoms are the one or more manifestations of Bladder, Bone, Brain, Breast, Colorectal, Kidney, Lung, Blood, Oral, Ovarian, Pancreatic, Prostate, Stomach, and Uterine cancer.

Causes :

⇒ Drinking frequently cause alcoholism, harming nervous system and liver, Alcohol is proved as a factor causing cirrhosis and then may be developing to liver cancer.

⇒ Smoking and Chewing tobacco is the major cause of lung and oral cancer in India.

⇒ Infections by virus (Hepatitis B Virus and liver cancer, Human Papilloma Virus (HPV) and cervical cancer) and bacteria (Helicobactar pyloria and gastric cancer) and parasites (schistosomiasis and bladder cancer)

⇒ Exposure to asbestos

⇒ Physical carcinogens such as ultraviolet (UV) and ionizing radiation.

⇒ Most of the cancers are "sporadic', and have no basis in heredity. But if one has a family history of cancer, such as breast cancer, taking extra precautions is vital.

Control and Prevention :

⇒ Giving up tobacco and alcohol

⇒ Detected early and treated adequately

⇒ Reduced exposure to sunlight

⇒ Treatment services by giving priority to early detectable tumours and potentially curable cancers.

⇒ Healthy diet and physical activities and avoidance of obesity :

⇒ Reducing carcinogenic occupational and environmental exposures :

⇒ Follow safe sex practices to lower the risk of sexually transmitted infections that are linked to cancers of the cervix, vagina, and liver.

9.6 Hepatitis B

Hepatitis B is caused by a virus that affects the liver. Adults who get hepatitis B usually recover. However most infants at birth become chronic carriers i.e. they carry the virus for many years and can spread the infection to others. In 2000, there were as estimated 5.7 million cases of acute hepatitis B infection and more than 521 000 deaths from hepatitis B-related disease (WHO)

Symptoms :

⇒ Hepatitis B Infections in young children generally is asymptomatic

⇒ Feeling of weakness and tiredness

⇒ Flu-like symptoms

⇒ Stomach Upset

⇒ Very dark urine

⇒ Very pale stools

⇒ Yellow skin or a yellow colour in the whites of the eye.

Causes

⇒ From mother to child at birth

⇒ Through shared syringes, needle-stick injuries

⇒ Sexual contact

⇒ Bites and scratches

⇒ By parenteral (blood-to-blood) exposure to blood or other infected body fluids

Control and Prvention

⇒ All blood and blood products are screened and not collected from the people at risk of infection.

⇒ Use of condoms to prevent sexual transmission of hepatitis B

⇒ Giving three doses of hepatitis B vaccine during the first year of life and immunizing adolescents, health workers and other risk groups.

9.7 Malaria

Malaria is a disease that is caused by the presence of very small organisms (malaria parasites) in the blood. Malaria parasites are so small that they can only be seem under a microscope. They feed on the blood cells, multiply inside them and destroy them (WHO, 1996). Malaria is spread through the bite of female anopheles mosquito. In India malaria is very common during July to November (When pools of rain water can be found in village India.)

Symptoms:

⇒ Periodic attack of fever

⇒ Each attack may last several hours and often begins with shivering (body shaking); and ends with profuse seating.

⇒ Headache and pains in the back, joint, and all over the body.

⇒ Loss of appetite, vomiting and diarrhoea

⇒ Repeated attacks may lead to anaemia and weakness

⇒ Fever usually comes on every alternate day, however in some cases it may come every day

Causes :

⇒ The malaria parasites enter and leave the body through the bites of female anopheles mosquito. According to WHO (1996) when a mosquito bites a person it sucks up blood, and if the person has malaria, some of the parasites in the blood will be sucked into the mosquito. The malaria parasites multiply and develop in the

mosquito and after, 10-14 days they are mature and ready to be passed on to someone else.

⇒ Female anopheles mosquitoes breed in clean stagnant water.

Control and Prevention

⇒ Sleeping under mosquito nets

⇒ Spraying the inside walls of houses with insecticides that kill mosquitoes.

⇒ Put cover on the utensils containing water, big water storage container, pits in and around and households.

⇒ Breed gambuchi fish in the ponds and other water storage.

⇒ Encourage the people to fumigate their houses with Neem leaves

⇒ Reclaim land by filling and draining

⇒ Put special insecticides in the water to kill mosquito larvae.

⇒ Burn mosquito coils, apply mosquito repellents to the skin, spray rooms with insecticides before going to bed.

9.8 Diarrhoea

According to UNICEF, WHO, UNESCO, UNFPA, UNPD, UNAIDS, WFP and the World Bank (2002) diarrrhoea kills over 1 million children every year through dehydration and malnutrition. Children are more likely than adults to die from diarrhoea because they become dehydrated more quickly.

WHO (2005) tried to define diarrhoea in the following manner –

Diarrhoea is the passage of unusually loose or watery stools, usually at least three times in a 24 hour period. However, it is the consistency of the stools rather than the number that is most important. Frequent passing of formed stools is not diarrhoea. Babies fed only breast-milk often pass loose, "pasty" stools ; this also is not diarrhoea. Mothers usually know when their children have diarrhoea and may provide useful working definitions in local situations.

Symptoms

⇒ Passes watery stools many times in one or two hours.

⇒ Presence of blood in the stools

⇒ Vomiting regularly

⇒ Having fever

⇒ Extremely thirsty

⇒ Having no want to drink

⇒ Reluctant to eat, sometimes refusing

⇒ The eyes sink into sockets

⇒ Lips, mouth and tongue become dry

⇒ Dark urine, small in amount

⇒ Weakness and lethargic

⇒ Skin pinched up between two fingers returns to normal slowly.

However, here it should be mention that symptoms depend on the types of diarrhoea. WHO (2005) gave the following details about the various types of diarrhoea-

● *acute watery diarrhoea* (including cholera), which lasts several hours or days, the main danger is dehydration ; weight loss also occurs if feeding is not continued.

● *acute bloody diarrhoea,* which is also called *dysentery ;* the main dangers are damage of the intestinal mucosa, sepsis and malnutrition; other complications, including dehydration, may also occur;

● *persistent diarrhoea,* which lasts 14 days or longer : the main danger is malnutrition and serious non-intestinal infection ; dehydration may also occur;

● *diarrhoea with severe malnutrition* (marasmus or kwashiorkor) the main dangers are severe systemic infection, dehydration, heart failure and vitamin and mineral deficiency.

Causes :

⇒ Contaminated water

⇒ Shortage of clean water for drinking, cooking and cleaning and basic hygiene

⇒ Water contaminated with human and animal faeces

⇒ Prepared or stored food in unhygienic conditions

⇒ Fish and seafood from polluted water

⇒ Poor personal hygiene, not washing hands after defecatin and befor handling of food.

⇒ Lank of and non-use of Sanitary Latrines

Control and Prevention

⇒ During the first 6 months of life, infants should be exclusively breastfed.

⇒ Wash hands with soaps thoroughly after defecation, after cleaning a child who had defecated, after disposing of a child's stool, before preparing food, and before eating.

⇒ Presence and use of a clean, functioning latrine.

⇒ Collection of clean water from a safe source like tube-wells, If there is any possibility that the water is not clean, then it should be purified by boiling and/ of filtering.

⇒ A child with diarrhoea needs breast-milk (mothers should breastfeed more often than usual), soups, rice water fresh fruit juices, coconut water and oral rehydration salts (ORS) mixed with the prper amount of clean water.

ORS solution

A special drink for diarrhoea

What is ORS?

ORS (oral rehydration salts is a special combination of dry salts that, when properly mixed with safe water, can help rehydrate the body when a lot of fluid has been lost due to diarrhoea.

Where can ORS be obtained?

In most countries, ORS packets are available from health centres, pharmacies markets and shops.

To make the ORS drink:

1. Put the contents of the ORS packet in a clean container. Check the packet for directions and add the correct amount of clean water. Too little water could make the diarrhoea worse.

2. Add water only. Do not add ORS to milk, soup, fruit juice or soft drinks. Do not add sugar.

3. Stir well, and feed it to the child from a clean cup. Do not use a bottle.

How much ORS drink to give?

Encourage the child to drink as much as possible.

A child under the age of two needs at least a quarter to a half of a large cup of the ORS drink after each watery stool.

A child aged two or older needs at least a half to a whole large cup of the ORS drink.

after each watery stool

Diarrhoea usually stops in three or four days. If it does not stop after one week, consult a trained health worker.

Adapted from *Facts for Life,* Third edition published in 2002 by UNICEF, WHO, UNESCO, UNFPA, UNDP, UNAIDS, WFP and the World Bank.

⇒ Not allow bathing , washing, or defecation near the water collection source

⇒ Good personal hygiene

⇒ Keep animals away from protected water sources'

⇒ Keep water in clean containers and cover the same

⇒ Cook food until it is hot throughout and Eat food while it is still hot, or reheat it thoroughly before eating;

⇒ Keep cooked food and clean untensils separately and cover the utensils to protect the food from flies.

9.8 Leprosy

Leprosy is regarded as a chronic inflammatory disease of skin and nerves caused by *Nucobacterium laprae*. Leprosy is easily curable by multidrug antibiotic therapy (MDT).

Symptoms :

⇒ Pale or reddish or copper-coloured and flat or raised patch or patches on the skin with a definite loss of sensation. Patches usually do not itch or hurt.

⇒ It affects the skin and nerves

⇒ Lack of sensation in patch areas to heat, touch or pain

⇒ If not treated properly, there may be progressive and permanent damage to the skin, nerves limbs and eyes.

⇒ Reddish or skin-coloured nodules or smooth, shiny diffuse thickening of skin without a losss of sensation (WHO, 2000)

Causes :

Leprosy is not very contagious as only about 20 per cent of leprosy patients are infectious, WHO found out that Leprosy is transmitted via nasal discharge and droplets from the respiratory tract of untreated patients with severe disease, although it may also occur via skin contact.

Control and Prevention :

⇒ A World Health Organization (WHO) Study Group recommended multidrug therapy (MDT) in 1981. MDT consists of three drugs : dapsone, rifampicin and clofazimine. This drug combination kills the pathogen and cures the patient.

⇒ Early detection and early treatment is very helpful in avoiding physical deformity.

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9.10 Review Question

Write down symptoms, causes of the TB, VD, AIDS, Cancer, Hepatitis B, Malaria. Diarrhoea, and Leprosy and preventive measures to be taken to promote community health.

Unit 10 □ Role of Social Workers in School Health Services

Structure

10.1 Introduction

Changes in contemporary society, the provision of health care, education, and the structure of the family have increased the necessity and demand for school health services. To address the diverse and complex health problems of students of today new kind of school health services are need of the hour. In addition to health issues, schools are trying hard to cope with problems caused by socio -economic, family and marriage related problems, poverty, substance abuse, and violence.

A social worker has a central management role in the implementation of the school health services for all children and youth studying in the school. Generally, the social worker collaborates with primary care providers, specialists/consultant physicians, and local health authorities, Local Government and NGOs to ensure a effective and quality health services to the children, adolescents and youths

According to American Acadamy of Pediatrics (AAP) goals of the school health programmes are–

⇒ Ensure access to primary health care

⇒ Provide a system for dealing with crisis medical situations;

⇒ Provide mandated screening and immunization monitoring; and

⇒ Provide a process for identification and resolution of students' health care needs that affect educational achievement.

These goals are focusing on the prevention and early intervention to help the students to live a happy and prosperous life in future. The social workers could play a critical role to implement and manage the school health promotion activity. Apart from that social workers can provide health education and health counselling and advocate for students with disabilities. Social workers will also be instrumental in making partnerships with local doctors, community organization, youth clubs and NGOs, Municipalities and Panchayats and Insurance Agencies (for group insurance of children) to make the school health services a participatory, holistic and successful one, From the successful school health programmes it can be stated there are 3 major roles to be played by the social workers in school health services–

1. Providing health education to the students. Focus will be on how to improve health and prevent illness.
2. Providing limited health care services to treat common illness early, before they become serious, First Aid and referral services in case of severe ailments.
3. Helping the student community to change their knowledge, values, beliefs attitudes and practices and to rectify myths and misconceptions so that they can lead a healthier lives.

10.2 Role of Social Workers in Promotion of Personal Hygiene in School

Social workers will encourage the students–

⇒ To keep injuries and minor cuts clean
⇒ To make regular bath with soap
⇒ To wash their hands after defecation
⇒ To wear clean clothes
⇒ To trim their nails regularly
⇒ To brush the teeth twice daily
⇒ To wash private parts from front to back after defecating or urinating
⇒ To change the undergarments regularly
⇒ To keep the pubic hair short
⇒ To use sanitary napkin or a clean, washed and sun-dried cloth during the time of menstruation.

10.3 Role of Social Workers in Providing Classroom facilities

Social workers should use direct observation method to analyze the classroom facilities in a school. He/She may also organize discussion with the students, teachers, and members of the governing body, Panchayats and any other concerned person to ascertain the number of children vis-a-vis number of classrooms, seating arrangements, blackboards available furniture, books, learning materials, audio-visual facilities, games materials etc. Social workers will try to convince the local authorities, Panchayats, Municipalities, Local MLAs and MPs and NGOs, Donors and common people of the area to provide required classroom facilities to the students.

10.4 Role of Social Workers in Promotion of healthy physical school environment

The physical school environment encompasses the school building and all its contents including physical structures, infrastructure, furniture, and the use and presence of chemicals and biological agents; the site on which a school is located; and the surrounding environment including the air, water, and material with which children may come into contact, as well as nearby land uses, roadways and other hazards (WHO information Series on School Health).

To promote healthy physical environment in schools social workers must promote the following components as proposed by WHO–

⇒ Provision of basic necessities..
- Shelter
- Warmth
- Water
- Food
- Light
- Ventilation
- Sanitary facilities
- Emergency medical care

⇒ Protection from biological threats
- Molds
- Unsafe of insufficient water
- Unsafe food
- Vector-borne diseases

- Venomous animals
- Rodents and hazardous insects
- Other animal (e.g. dogs)

⇒ Protection from physical threats.
- Traffic and transport
- Violence and crime
- Injuries
- Extreme heat and cold
- Radiation

⇒ Protection from chemical threats
- Air pollution
- Water pollution
- Pesticides
- Hazardous waste
- Hazardous materials and finishes
- Asbestos, paint
- Clening agents

10.5 Role of Social Worker in Promotion of School Sanitation

According to UNESCO access to clean water and adequate sanitation facilities is a fundamental right that safeguards health and human dignity. Schools offer a unique setting for the development and implementation of programmes to help need that right. UNESCO justified the statement by stating the following reasons–

⇒ Children spend long hours in schools, so the school environment has a significant impact on their health and well being. An unsanitary or unsafe school environment can be the cause of sickness, injury or emotional distress.

⇒ It is generally recognized that childhood is the best time for children to learn hygiene behaviours. Compared to adults, children tend to be more receptive to new ideas and new ways of doing things. They can more easily change their behaviour or adopt new behaviours as the result of increased knowledge and opportunities to practice new skills.

⇒ Children and youth have important roles in the household, taking care of younger brothers and sisters and helping with daily chores, They are eager to learn and to help. If they feel that health and environmental issues are improtant, and that they have a role to play, they can contribute in significant ways to efforts to protect their own and other health, Depending on the culture, they may become agents of change

within the family and the community by questioning harmful practices and mode of change within the family and the community by questioning harmful practices and modelling new behaviours.

⇒ Children are future parents an what they learn is likely to be applied during the rest of their lives. Being tomorrow's parents, they have the potential to ensure the sustainability of a programme's impact.

⇒ Schools are not only important places of learning for children; they are part of the fabric of community life. Through their links to other community institutions. and through their students, especially, they are usually in touch with a large proportion of the households in a community. If appropriate water and sanitation facilities are available in schools, they can serve as a model for such facilities in homes and other places in the community. Schools can also influence their communities, and especially families, through outreach activities.

⇒ Teachers, as professionals an influential individuals are important role models for their students and for other adults. By demonstrating positive attitudes and the appropriate use of facilities, they can help to ensure that investments in sanitation "hardware" are supported by changes in individuals' hygiene behaviour.

⇒ While the problems associated with poor sanitation and hygiene are disastrous for infants and young children,they also affect the health an school attendance of older children and adolescents. Keeping young people in school for a sufficient number of years is essential to the goals of universal basic education.

These statements of UNESCO will be helpful for the social workers to advocate school sanitation in a more appropriate way.

UNICEF and IRC after recognizing the importance of the school sanitation admitted that three factors have to be addressed if lasting changes in hygiene behaviour are to occur. These are :

–Predisposing factors–knowledge, attitude and belief ;

–Enabling factors–availability of resources like latrine facilities and safe water supply, enabling students to transform newly acquired knowledge, attitudes and beliefs into desirable behaviours;

–Reinforcing factors–factors affecting the students' ability to sustain certain behaviour, like support and cooperation received from parents, guardians and peer groups.

Keeping these in minds social workers must take initiatives to promote sanitation at schools. For installation of separate sanitary units for boys and girls they can contact with the local Panchayats and Sanitary Marts, Social workers should also have a dialogue with the parents, guardians and out of school peers to aware them about the benefits

of the sanitation and encourage them to install sanitary units in their dwelling if they have none. Lastly social workers should teach the pupils to use the sanitary facilities and wash their hands after defecation.

10.6 Role of Social Workers in Promotion of Child to Child Practice

The child to child approach to health education was first introduced in 1978 by a team of health and education professional at the University of London to help school-aged children to learn about the disseminate basic health information to their peers and brothers and sisters. The basic premise of this approach is that if given the required opportunity, our children can make valuable contributions to the improvement of health and well-being of themselves and others living in the same house or neighbourhoods.

According to Sara Gibbs, Gillian Mann and Nicola Mathers (2002) some of the intended result of the chid to child approach are :

⇒ Children feel more able to tackle community problems
⇒ Children feel better about themselves.
⇒ Children work better in groups,
⇒ Children know more about their chosen issue
⇒ Children and adults communicate more openly with one another
⇒ Children being more likely to speak out about issues of concern of them
⇒ Children know more about resources and services that exist in their community
⇒ The community being more open to listening and involving children
⇒ Family and community respecting children's ideas and capabilities

Again from the writhing of them we are here giving details of the roles of the social workers as facilitators in promotion of child to child approach.

⇒ Listen carefully to children
⇒ Take children's opinions and experiences seriously
⇒ Be flexible
⇒ Be open and approachable
⇒ Give time to the process
⇒ Guide and encourage
⇒ Consider children's needs

⇒ Keep a sense of humour
⇒ Be patient
⇒ Be creative
⇒ Be democratic
⇒ Listen to criticism
⇒ Provide concrete opportunities
⇒ Give regular feedback
⇒ Share power
⇒ Learn from mistakes

Child-to-Child Trust proposed following six steps to promote health through child to child approach–

Identifying a local health issue and understanding it well-Children and/or their teacher/ facilitator identify a priority health issue. The issue chosen may relate to a stated objective of the school curriculum or syllabus, or to a health campaign taking place in the community. Once an issue is identified, the children carry out activities designed to increase their understanding of it

Finding out more the health issue– This step involves children in further information gathering activities. Some of these activities may take place inside the school, while others might take place in the community or at home. Ideally, these activities help children to learn how to gather and document information and develop important communication skills.

Discussing what's been found out and planning action– Here the children organize their findings and use them as a basis for planning action in relation to specific health problems they have identified during step 2. The teacher/facilitator can take part in the planning process, and help children to distinguish between correct and incorrect information they might have gathered.

Taking action –The children undertake the activities planned at step 3. These might take place in school, community or home, depending on the nature of the health issue chosen. The type of activities undertaken may also depend on local customs and the nature of the relationships in the community, including between the school and community.

Evaluation : discussing results–The children and their teacher/facilitator evaluate the effectiveness or otherwise of their activities. If unexpected problems have been encountered, it is important for these to be discussed.

Discussing how we can be more effective next time and sustain action Step 6 invites children to improve upon the activities they implemented at step 4 and, if appropriate, to repaeat or continue their action.

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10.8 Review Questions

To promote school health what will be roles of social workers?

Unit 11 □ Elements of Nutrition and Balanced Diet, Nutrition Requirements in Different Target Groups

Structure

10.1 Introduction

Food is needed for human survival. Good nutrition promotes and maintains a nutritional status capacitates the people to grow well and enjoy good health. Health is the state of wellbeing of body and mind. The secret to good health is balanced nutrition. Nutrition is obtained from food and helps in formation, maintenance and protection of health. The body organs receive nutrition from food and water and maintain their normal functioning and develop immunity against diseases. Optimal balance of nutrition enables optimal performance of the body. Earlier nutrition was considered as one of the element of health aspect recently, nutrition status of human being has been interpreted from the sociological point of view. Nutritional status determines the preventive health, mother and child health, family health, but socioeconomic factors like poverty, illiteracy, lack af awareness, unhealthy physical environment, and sanitation system have great impact on health.

Nutrition is required :

1. In maintenance of adequate energy level
2. In formation of body structure and in maintenance of normal functioning of muscles, bones and other organs and in building immunity and
3. In repair, protection and development of the system of organisms.

11.2 Elements of Nutrition

There are six basic categories of nutrients: they are as follows–

⇒ Carbohydrates
⇒ Protein
⇒ Vitamin
⇒ Fat
⇒ Minerals and
⇒ Water

11.3 Carbohydrates

The body receives sufficient energy from the food enriched with carbohydrates. Carbohydrates provide energy for all the cells of human body. A 1 gram carbohydrate gives 4 calories. It is also helping the body for effective utilization of fats. In deficiency of carbohydrates, the body receives necessary energy from protein and fat. There are two types of carbohydrates found in foods. Simple carbohydrates, which include the sugars that are found in milk, fruit and sweets, like cookies, rasogollas, candy, provide quick energy. Human body digests simple carbohydrates quickly and easily. Complex carbohydrates include fiber and starchy foods. This type of carbohydrate takes time to digest and gives slowly and gradually. A good source of complex carbohydrates is found in vegetables, potatoes, rice, flour, cereals and bread.

11.4 Fat

Fat nutrients influence body function in various ways–

⇒ In production and storage of energy and in balancing body temperature
⇒ In absorbing shock and in protecting organs from decay
⇒ In maintaining normal functioning of glands

⇒ In transporting lipoprotein (a combination of fat, protein and other fat related substances) vitamin in natural occurrences of cholesterol in tissues.

⇒ In maintenance of normal functioning of heart, intestine etc.

1 gram fat gives human body 9 calories. Human body receives fat from ghee, butter, milk, cheese, egg, meat, fish, groundnut, mustard, coconut, vegetable oils, etc.

11.5 Proteins

Proteins are the important component of human diet. Proteins are made up of 20 different amino acids. These acids can combine in many different ways to produce different proteins. Essential amino acids are obtained from foods and non-essential amino acids are naturally produced in organisms. The utilities of proteins are the following–

⇒ Protein nutrients help in formation, growth and repair of tissues and build up new tissues. Protein transport blood in cells through enzymes, hormones and hemoglobin

⇒ In protection and maintenance of tissues, proteins are used

⇒ Protein is used in generating energy in organism during deficiency of calories.

⇒ Proteins are also necessary for synthesis of some substances like antibodies. hemoglobin, enzymes and hormones.

⇒ Protein strengthens the immunity power of human body.

Protein constitutes about 20% of the human body weight. Proteins are available from milk, egg, meat, fish, pulses, beans, peas, soya-beans, nuts, oilseeds and cereals.

11.6 Vitamins

Vitamin nutrients help in normal functioning of eye, heart and urinary tract, it is used to maintain normal functioning of glands. It is used in formation of bone structure and in development of immunity against diseases.

Two types of vitamin nutrients are available from food–

1. Vitamin-A, D, E and K (fat soluble-they can be stored in th human body)
2. Vitamin-C, Bs, (water soluble-have to consume everyday as they cannot be stored in the human body)

Vitamin	What it Does	Source
A	promotes healthy teeth, bones & skin ; helps you see well	fortified milk, eggs, carrots spinach, cantaloupe
Bs	helps body form energy, helps form red blood cells; promotes healthy nerves, skin & blood	eggs, milk, whole grain breads & cereals, broccoli, beans
C	helps heal wounds and resist infection; promotes healthy bones and teeth.	strawberries, oranges, tomatoes, potatoes,
D	promotes healthy bones and teeth by helping the body to absorb and use calcium and phosphorous.	fortified milk, eggs, tuna & salmon.
E	helps form and protect body tissues	vegetable oils, lettuce spinach
K	helps blood clot	broccoli, spinach

Source : http://www.veggie-mon.org/students/VM nutrition/nutrition/Vitamins.htm

11.7 Mineral

Mineral nutrients is the inorganic substances needed in formation of teeth, bones and in coagulation of blood, muscles contraction and maintenance of normal and haemoglobin. However, minerals are not in a a position to control bodily functions as they are in small quantity in the human body. But more than 50 mineral are found in the human body.

Mineral	What It Does	Source
Calcium	promotes strong bones & teeth; helps muscles work	milk, yogurt, leafy green vegetables red meat, whole grain
Iron	helps blood carry oxygen	breads, beans, raisins, & spinach
Magnesium	helps muscles contract ; aids nervous system	milk, vegetable, yogurt nuts
	promotes strong teeth & bones;	

Phosphorous	takes part in cell activities (energy metabolism)	red meat, milk, eggs, nuts,
Zinc	helps wounds heal ; needed for growth	oysters, meat, whole grains, nuts & seeds

Source : http://www.veggie-mon.org/students/VM_nutrition/nutrition/minerals.htm

11.8 Water

Water is one of the most important parts of human diet. Water is a useful ingredient required by human body for maintenance of normal functioning. All the metabolic reactions, working of cell take place in water substances in the organisms. Water helps in keeping the body temperature constant. Water is transporting things like nutrients, carbon dioxide, oxygen and hormones and keep human alive. Water aids in digestion and even keeps your eyes from drying out. Water is obtained through drinking water and food. Here one must remember that drinking water is the source of germs like typhoid, choler, worm, jaundice, diarrhoea, etc.

11.9 Balance Diet

A balanced diet means a diet with the following components–

⇒ Energy yielding foods (carbohydrates, fats)

⇒ Body-building foods (protein, minerals) and

⇒ Protective foods (vitamins) in correct propositions.

Balanced diet is an assurance to the individual that he or she is obtaining the minimum requirements of all the nutrients. The components of a balanced diet will differ according to age, sex, physical activity, economic status, occupation and the physiological state like pregnancy, lactation etc.

Healthy Diet for a Day		
Food Group	No of Serving	Size/Serving
Cereals	10-11	1 roti (25 g wheat flour) 1 bread 1 katori rice, 25 g raw dalia/cornflakes/suji
Pulses	2	12g raw dal
Milk	2	250 ml milk
Fruit and vegetables	5	100 gm fruit 100-125 gms raw vegetables
Fat and oil	3-4	1 tea spoon

Source : Ministry of Health and Family Welfare, Government of India.

11.10 Nutrition Requirements among Infants

Small amount of

⇒ Well boiled vegetables

⇒ Fruit juice

⇒ Rice

⇒ Pulses

⇒ Egg

⇒ Fish

⇒ Meat and

⇒ Milk products should be given to the infants along with breast milk as a supplementary diet. Fried and spicy food should be avoided.

WHO (2005) recently published a guideline for feeding non-breastfed children 6-24 months of age suggested the following:

⇒ Meat, poultry, fish or eggs should be eaten daily, or as often as possible, because they are rich sources of many key nutrients such as iron and zinc. Milk products are rich sources of calcium and several other nutrients. Diets that do not contain animal-source foods (meat, poultry, fish or eggs, plus milk products) cannot meet all nutrient needs at this age unless fortified products or nutrient supplements are used.

⇒ If adequate amounts of other animal-source foods are consumed regularly, the amount of milk needed is ~200-400 mL/d ; otherwise, the amount of milk needed is ~ 300-50 mL/d. Acceptable milk sources include full-cream animal milk (cow, goat, buffalo, sheep, camel), Ultra High Temperature (UHT) milk, reconstituted evaporated (but not condensed) milk, fermented milk or yogurt, and expressed breast milk (heat-treated if the mother is HIV-positive)

⇒ If milk and other animal-source foods are not eaten in adequate amounts, both grains and legumes should be consumed daily, if possible within the same meal, to ensure adequate protein quality.

⇒ Dairy products are the richest sources of calcium. If dairy products are not consumed in adequate amounts, other foods that contain relatively large amounts of calcium, such as small fish that include the bones (dried or fresh, with the bones crushed or otherwise processed so that they are safe to eat) and lime-treated maize tortillas, can fill the gap. Other foods such as soybeans, cabbage, carrots, squash, papaya, dark green leafy vegetables, guava and pumpkin are useful additional sources of calcium.

⇒ The daily diet should include Vitamin A-rich foods (e.g. dark coloured fruits and vegetables ; red palm oil, vitamin A-fortified oil or foods) ; vitamin C-rich foods (e.g., many fruits, vegetables and potatoes) consumed with meals to enhance iron absorption ; and foods rich in the B vitamins including riboflavin (e.g. liver, egg, dairy products, green leafy vegetables, soybeans) vitamin B6 (e.g. meal, poultry, fish, banana, green leafy vegetables, potato and other tubers, peanuts) and folate (e.g.. legumes green leafy vegetables, orange juice).

⇒ Provide diets with adequate fat content. If animal source foods are not consumed regularly, 10-20 g of added fats or oils are needed unless a fat-rich food is given (such as foods or pastes made from groundnuts, other nuts and seeds). If animal source foods are consumed, up to 5 g of additional fats of oils may be needed.

⇒ Avoid giving drinks with low nutrient value, such as tea, coffee and sugary soft drinks. Limit the amount of joice offered, to avoid displacing more nutrient-rich foods.

11.11 Nutrition Requirements among Pre-school Children

During this period, appropriate food and nutrition is to be given to the child for proper physical growth and development. The child get acquainted to various kinds of food. Proper care should be given to ensure weight increase of the child, and to see the child maintains his /her normal activities and restlessness. In this period, the

child should be encouraged to eat fruits, vegetables, fish, meat, egg, nuts, dry fruit, cereals and various milk products which are good for building bones, teeth, muscles, etc, the child should be given a balanced meal of protein, fat, carbohydrate, calcium and iron. Parents should help child adjust to the family food habits and to take food properly.

11.12 Nutrition Requirements among Nursing Mothers

Ministry of Health and Family Welfare, Government of India and WHO proposed following in relation to the nutritional requirements among nursing mothers.

⇒ Nursing women should eat more quantity than the normal food intake. She needs one extra helping family food.

⇒ Since she has to breastfeed the child and therefore needs to consume lots of fluids

⇒ She needs to eat vitamin A rich food, like milk with cream, butter, ghee, all the dark yellow and orange fruits and vegetables, which are rich in carotene.

⇒ She needs to eat green leafy vegetables.

11.13 References

1. Guiding Principles for Feeding non-breastfed Children 6-24 months of Age by WHO
2. Women's Health–Towards Empowerment : A District Level Training Module–Ministry of Health and Family Welfare, Government of India and World Health Organisation.
3. Healthy Eating–Ministry of Health and Family Welfare, Govenment of India
4. Nutrition Essentials : A Guide for Health Manager–WHO, BASICS/UNICEF

11.14 Review Questions

1. Write a short note on elements of nutrition.
2. What is balanced diet?
3. Give details of the nutritional requirements during infancy and early childhood years.

Unit 12 □ Causes, Symptoms and Treatment of Mental Disorder

Structure

12.1 Normality vs Abnormality

- **Statistical Infrequency**–One aspect of abnormality is that it is infrequent. An assertion that majority of individuals tends to display behavioral or emotional characteristics that is normal. However, though, having certain rare characteristics may be easily detectable, but possessing those may not always deem an individual as abnormal e.g. great athletic ability.
- **Deviation**–Each society establishes explicit and implicit rules for proper conduct, Behaviour, thoughts and emotions are deemed abnormal when they violate a society's ideas about proper functioning. A society's norms grow out of its culture, its history etc, So judgements of abnormality. based on socio-cultural norms are relative and may vary from society to society. A society's values may also change over time causing its views of what is psychologically deviating to change as well. Also, just the violation of societal norm does not necessarily qualify the individual as psychologically abnormal. Criminals and prostitutes violate social norms. But they are rarely studied within the domain of abnormal psychology.
- **Distress**–According to many clinical theorists, any behaviour, thought or emotion has to cause significant personal distress, before it can be labeled abnormal. However, there is an exception to this theory. Some people, by virtue of their abnormal psychological functioning experience an inappropriate sense of subjective well-being.

- **Dysfunction**–Abnormal behaviour tends to interfere with daily functioning; people cannot take care of themselves, participate in ordinary social interactions or work productively. Once again, there are exceptions to this theory. Revolutionaries and social leaders like Jatin Das, Bhagat Singh, and Gandhi etc. had deprived themselves of things they need and temporarily acted in a dysfunctional manner to protest against social injustice. But instead of labelling them as abnormal people have always admired them.
- **Unexpectedness**–Perhaps an important point in conceptualization of abnormality is unexpected responses to stressors /stimuli. Distress or disability are thus considered as normal or abnormal depending upon whether the individual's response is an expected or unexpected response pattern to the stressor / stimulus that provoked it. For example anxiety disorders are diagnosed when anxiety is unexpected and out of proportion to the situation. Thus, *a person who has been exposed to harsh and traumatic experiences.* the *"expected"* response will be of *"distress"* and *"dysfunction"* and it will be *technically incorrect and unethical* to label the person as *"abnormal"*.

  Thus, a perfect conceptualization should synthesize all these aspects to arrive at a true picture of deviating human psychological functioning.

6.2 Classification of Functional Psychiatric Illnesses

AXIS I		AXIS II	
ANXIETY DISORDERS	GENERALIZED ANXIETY DISORDER	PERSONALITY DISORDERS	CLUSTER A • SCHIZOID • SCHIZOTYPAL • PARANOID
	PHOBIA		
	OBSESSIVE COMPULSIVE DISORDER		CLUSTER B • ANTISOCIAL • BORDERLINE • HISTRIONIC • NARCISSISTIC
	PANIC DISORDER		CLAUTER C • DEPENDENT • AVOIDANT • OBSESSIVE COMPULSIVE

<table>
<tr><td rowspan="4">MOOD DISORDERS</td><td>DEPRESSION</td><td rowspan="4">MENTAL RETARDATION</td><td>MILD</td></tr>
<tr><td>MANIA</td><td>MODERATE</td></tr>
<tr><td>BIPOLAR AFFECTIVE DISORDER</td><td>SEVERE</td></tr>
<tr><td></td><td>PROFOUND</td></tr>
<tr><td colspan="2">SCHIZOPHRENIA</td><td colspan="2"></td></tr>
<tr><td colspan="2">SUBTANCE DEPENDENCE DISORDERS</td><td colspan="2"></td></tr>
</table>

DSM-IV has distinguished beteen **Axis I** and **Axis II** disorders. Axis I disorders are those which often begin as a noticeable change in a person's usual behaviour and are in most cases. of limited duration. The axis II disorders begin well before adulthood and may continue into adulthood and these pattern are not marked by changes in intensity or periods of clear imporvements.

DSM-IV and **ICD-10** are internationally accepted and accredited ***classificatory systems*** for diagnosing and conducting research on mental illnesses. The ***American Psychiatric Association*** publishes the DSM-IV and the ***World Health Organization*** published the ICD-10

6.3 Anxiety Disorders

In anxiety disorders the most striking features are mental and physial features of anxiety occurring in the absence of any organic brain disease.

Generalized Anxiety Disorder

- **Symptoms**
  1. Chronic uncontrollable, diffuse anxiety called "free floating anxiety"
  2. At least for 6 months
  3. Somatic complaints like sweating, pounding heart, dry mouth, frequent urination, shortness of breath i.e., hyperactivity of autonomic nervous system (A.N.S.)
  4. Irritability, insomnia, distractibility, anger outbursts
- **Aetiology**
  1. **Biological Perspective**–The low activity of the inhibitory neurotransmitee gamma amino butyric acid (GABA) has been linked to generalized anxiety disorder. Neurotransmitters are chemicals that carry messages from one neuron to another in the brain. GABA carries inhibitory messages i.e. when GABA is received at a receptor ; it causes the neuron to stop firing. In normal

fear reactios, key neurons throughout the brain fire more rapidly, causing a general state of excitability in the brain and body. If this state of arousability continues for a period of time, a *feedback* system is called into action. which inhibits the excitation. In case of anxiety, GABA plays this role.

2. **Psychoanalytic Perspective**–The psychoanalytic perspective regards the source of generalized anxiety disorder as an unconscious conflict between ego and id impulses, which are sexual and aggressive in nature. The ego does not want to allow the expression of the id impulses for the fear of punishment. Since the source of anxiety is unconscious, the person experiences fear and apprehension without knowing it.
3. **Cognitive-Behavioural Perspective**–According to the cognitive-behavioural perspective, anxieyty is either classically conditioned to a vast range of external stimuli or else, there is a perception of not being in control.

Phobia

- **Symptoms**
  1. Persistent, unrealistic, fear that is out of proportion to the danger posed by a particular object or situation and is recognized by the sufferer as groundless.
  2. There is intense distress and socio-occupational impairment because of the anxiety
     - ⇒ ***Specific Phobia*** - Unwarranted fears are caused by the presence or anticipation of a specific object.
     - ⇒ ***Social Phobia*** - Unwarranted fears are generally linked to the presence of other people or apprehension on regative evaluation by other people.
- **Aetiology**

1. **Biological Perspective**–The biological perspective in the genesis of phobia holds that the autonomic nervous system, which is involved in the processing of fear, is more easily arousable in people with phobia. Lacey, (1967) identified a dimension of autonomic activity called stability -liability and proposed that phobic behaviour is characterized by autonomic liability.
2. **Psychoanalytic Perspective**–According to the psychoanalytic view, phobias represent defence against repressed id impulses. This anxiety is displaced from the feared id impulse and moved to an object or situation that has a symbolic connection to it. By avoiding them, the person is able to avoid dealing with repressed conflicts.

3. **Behavioural Perspective**–Behavioural theories hold that all phobias are learned reactions. They are acquired either through–
   i. *Classical conditioning* –the pairing of an innocuous object or situation with an innately painful event
   ii. *Operant Conditioning*–Whereby a person is rewarded for avoidance
   iii. *Modelling* –imitating the fear and avoidance of others
4. **Cognitive Perspective** –By making catastrophic misinterpretations of events that could be construed in a less negative fashion.

Obsessive Compulsive Disorder

- **Symptoms**

1. ***Obsessions*** are recurrent intrusive thoughts, which are resisted by the individual and recognized by the individual as his own e.g. obsessional doubts, ruminations, fears, images, and impulse.
2. ***The content of obsessions*** can be grouped under the following theme: *dirt and contaminations, aggression, orderliness, illness, sex, religion.*
3. ***Compulsions*** are voluntary and repetitive overt or covert actions that an individual resorts to in order to neutralize the anxiety or distress provoked by the obsessions.
4. ***Compulsions*** may take various ***forms*** like–*cleaning compulsions, checking compulsions, compulsions for order & symmetry, counting, compulsions, compulsive rituals* etc.

- **Aetiology**

1. **Biological Perspective**–Research on neurochemical factors has related OCD to low activity of the neurotransmitter serotonin. OCD has also been associated with mulfunctioning of the orbito-frontal cortex ; reflecting an over concern of the individual with his own thoughts ; and a set of subcortical structures like caudate nucleus and the basal ganglia; the result of the over activity of this circuit could manifest itself clinically as intrusive persistent thoughts, a visceral feeling of dread and sensations that "something is wrong" ; this send an intensely bothersome "*false alarm*" to the patient.
2. **Phychoanalytic Perspective**–In psychoanalytic theory, obsessions and compulsions are viewed to have similar roots i.e. in instinctual forces, which are sexual or aggressive in nature. These instinctual or id impulses are not under control because of overly harsh toilet training. The person is thus fixated at the

anal stage of psychosexual development. The symptoms represent the defense mechanisms employed by the individual as he / she struggles to control the id impulses. In case of OCD, the individual more commonly uses the defense of "Reaction Formation".

3. **Behavioural Perspective** –A prominent behavioural model of the acquisition and maintenance of obsessive-compulsive symptoms derives from the two-stage learning theory of Mowrer (1939). In *Stage I*–, anxiey is ***classically conditioned*** to a specific environmental event. The person then engages in compulsive rituals **(escape/avoidance responses).** If the person is successful in reducing the anxiety, the compulsive behaviour is more likely to occur in future (***Stage II-Operant Conditioning*), *Higher Order Conditioning*** occurs when other neutral stimulus such as words, images or thoughts are associated with the initial stimulus and the ***anxiety*** becomes ***diffused.***
4. **Cognitive Perspective**–The cognitive factors mediating obsessions maintain that the difference lies in the interpretation of the meaning of the presence of intrusive thoughts i.e. there is a pivotal role of responsibility appraisal in OCD, leading to a conclusion that catastrophic events are impending.

Penic Disorder

- **Symptoms**
  1. A sudden and often inexplicable attack of a host of jarring symptoms– laboured breathing, heart palpitations, nausea, chest pain, feelings of chocking, dizziness, sweating, trembling, an intense apprehension, feeling of impending doom.
  2 Panic attacks can occur in seemingly beging states, such a relaxation, in sleep, and in unexpected situations.
  3. Panic attacks can occur in the presence or absence of **"agoraphobia" :** is a cluster of fears centering on public places and from where escape is difficult or seemingly impossible.
  4. Agoraphobia is linked with a fear of having a panic attack, which further incapacitates the individual.
- **Aetiologgy**
  1. **Biological Perspective**– The biological theory suggests that panic is caused by the over activity in the noradrenergic system (neurons that use

norepinephrine as a neurotransmitter), particularly in a nucleus in the pons called the locus ceruleus.

2. **Cognitive Perspective** –The principal cognitive perspective of panic disorder is that patients misinterpret physiological sensations in a catastrophic way. In this over concern, they may amplify slight physical sensations into signs of impending disaster. The psychological explanation of agoraphobia suggests the "fear of fear" hypothesis i.e. a fear of having a panic attack in public produces the agoraphobia.

12.4 Mood Disorders

The mood disorders are so called because one of their main features is abnormality of mood.

Depression

- **Symptoms**
  1. Low Mood
  2. Decreased interest in pleasurable
  3. Increased fatiguability
  4. Low self esteem
  5. Pessimistic views about future
  6. Feelings of guilt
  7. Difficulty in attention and concentration
  8. Difficulty in taking decisions
  9. Disturbances in sleep, appetite & libido
  10. The ***first 3 symptoms must be present*** along with two or more of the other symptoms for a period of at least 2 weeks, for a diagnosis of depression.

- **Psychotic Symptoms**–May be present or absent in the form of delusions or hallucinations.

- **Aetiology**

  1. Biological Perspective–Low activity of the neurotransmittee serotonin and norepinephrine has been associated with depression. Over activity of the hypothalamic-pituitary-adrenal axis is also found among depressed patients. indicating that the endocrine system may also influence mood disorders.

2. **Psychoanalytical Perspective**–Psychoanalytic formulations stres fixation in the oral stage (leading to a high level of dependency) and unconscious identification with a lost loved one whose desertion of the individual has led to anger turned inwards ***(introjection)***.
3. **Cognitive Prespective**–According to Beck (1967), people with depression have certain characteristic ways of cognition. Beck proposed the ***"cognitive triad of depression"*** that consists of –***negative views of self, negative views of world*** and ***negative views of future***. These negative cognitive cognitions are sustained by illogical ways of thinking called ***"cognitive distortions"***.
4. **Behavioural Perspective–Helplessness-Hopelessness Theory**–According to helplessness-hopelessness theory, early experiences in inescapable,hurtful situation instill a sense of hopelessness that can evolve into depression individuals are likely to attribute failures to their own general and persistent inadequacies and faults.
5. **Interpersonal Perspective**–According to this viewpoint, depressed individuals tend to have spare social networks and to regard them as providing less social support. Reduced social support may lessen an individiual's ability to handle negative life events and make him or her vulnerable to depression. Behaviour of depressed people tends to elicit rejection from others.

Mania

- **Symptoms**

1. Elevated mood
2. Inappropriate sense of subjective well-being
3. Increased psychomotor activity
4. Disturbances in sleep, appetite & libido
5. Disturbances in cognitive function
6. Inflated self esteem
7. The ***first 3 symptoms must be present*** along with one or more of the other symptoms, at least for a period of 7days/1week

- **Aetiology**

1. **Biological Perspective**–The biological perspective to mania has associatied the disorder to high levels of the neurotransmitter norepinephrine and increased activities of G-proteins, which carry information across neurons and amplify neural signal.

2. **Psychological Perspective**–The psychological perspective of mania considers it as a defence against a debilitating psychological state, such as low self-esteem

Bipolar Affective Disorder

- **Symptoms**
  1. Is defined as including episodes alternating between mania and depression or consecutive episodes of mania
  2. Shows typical symptoms of retarded depression

     There are some other phenomenological between unipolar and bipolar affective disorders

     i. The age onset us earlier compared to unipolar depression
     ii. First degree relatives of people with bipolar affective disorder are at higher risk for developing either of unipolar depression.
     iii. First degree relative of people with unipolar depression are at higher risk of developing unipolar depression

- **Psychotic Symptoms**–May be present or absent in the form of delusion or hallucinations.

12.5 Schizophrenia

The concept of schizophrenia was initially formulated by two European psychiatrists ***Emil Kraepelin*** and ***Eugen Bleuler.*** Kraepelin provided some of the earliest and detailed descriptions of the "preocious" mental decline. He first presented his idea of ***Dementia Praecox,*** the early term for schizophrenia, in 1898. The term reflected his belief that the core symptoms of his disorder are–an early onset (***praecox***) and progressive intellecutal deterioration (***dementia***). Eugen Bleuler (1950), the second major pioneer of schizophrenia broke away from Kraepelin on the grounds that the term "dementia" was inaccurate and felt that schizophrenia did not represent a true intellectual deterioration or dementia. Instead, the illness involved a subordination of the intellect to the "fundamental" symptoms and to their devastating effect on mental life, The "fundamental" symptoms described by Bleuler were–

i) Disturbances of association
ii) Disturbance of affect
iii) Detachment from reality or autism
iv) Ambivalence

Despite shifts in emphasis within and between legacies of Bleuler and Kraepelin the same kinds of behaviour are included in contemporary accounts and analyses of schizophrenic symptoms. The only changes have been attempts to subcategorize sn differentiate some aspects of the illness from others. Thus, ***"positive"*** symptoms have been distinguished from***"negative"*** symptoms. Positive symptoms seem to be abnormal additions to mental life c.g. delusions, hallucinations, disorganized speech, Negative symptoms are deficits or losses like reduced motivation, impoverished speech or emotional withdrawal.

- **Symptoms of schizophrenia**

  The symptoms of schizophrenia involves disturbances in several major areas– thought, perception, affect or emotion, attention, motor behaviour, and life functioning

  i. ***Hallucination*** –sensory experiences in the absence of any stimulation from the environment. They occur most often in the auditory modality and less often in the visual modality. Some auditory hallucinations are regarded as pathognomic of schizophrenia such as "hearing own thoughts spoken aloud by another voice" and 'hearing voices arguing, commenting of commanding upon the action"

  ii. ***Delusion***–are firmly held implausible beliefs in spite of evidences to the contrary. Delusions may comprise delusions of influence (patient may believe that thought that are not his own have been placed in his mind by an external source) passivity (patient is the unwilling recipient of bodily sensations imposed by an external agency, and control (patient may believe that his feelings and behaviour are being controlled by an external agency) persecution, reference, infidelity etc.

  iii. ***Formal thought Disorder***–refers to the problems in the organization of ideas and in speaking so that a listener can understand.

  iv. ***Catatonic symptoms*** –characterized by several motor abnormalities *Catatonic Immobility / stupor* is characterized by patients adopting unusual postures and maintaining them for long periods of time. There may be accompanying muscular rigidity,. *Waxy flexibility* is a condition in which another person can move the patients's limbs into whatsoever positions, without his resistance which he will maintain for long periods of time. Some patients may manifest an unusual increase a their overall level of activity, including excitement, flailing of limbs and great expenditure of energy.

v. ***Avolition***– or apathy refers to a lack or absence of energy and seeming of absence of interest in what are usually routine activities (personal hygiene,. work, household chores).

vi. ***Alogia*** – is a negative thought disorder that can take several forms. In *poverty of speech,* the amount of speech is greatly reduced. In poverty of content of speech, the amount of discourse is adequate but it conveys little information and it tends to be vague and repetitive.

vii. ***Anhedonia***–refers to an inability to experience pleasure and is manifested as a lack of interest in recreational activities, failure to develop close relationships etc.

viii. ***Asociaity***–impaiments in social relations manifested as little interest in being with other people and poor social skills,.

ix. ***Flat or blunted affect/inappropriate affect*** –in patients with *flat effect* virtually no stimulus can elicit an emotional response. In case of *blunted affect,* emotional responseis attenuated, that is the emotional response is less intense. In case of inappropriate affect, the emotional responses are out of context e.g. a patient may laugh on hearing that his mother just died. That is thought processes become disconnected from feelings, making it haphazard, inconsistent and unpredictable.

- **Aetiology**

1. **Biological Perspective**–The biological holds that schizophrenia results form excessive activity of the neurotransmitter dopamine. Brain imagine techniques have detected abnormal brain structures like enlarged brain ventricles, excess thickended corpus callosum and abnormal cerebral blood flow and glucose metabolism in the frontal lobes.

2. **Psychological Perspectives–**

i. Schizophrenogenic Mother–A concept proposed by Fromm–Reichmmann (1948) and now mostly refuted, suggested that mothers who are cold, domineering and rejecting make their children vulnerable to develop schizophernia.

ii. **Schismatic Family/Skewed Family**–A child in dysfunctional family is mor vulnerable to develop schizophrenia as he/she is confused and caught between the conflicts of the parent where an attmpt to please one parent is viewed by the other as rejection and the parents are continuously trying to competing with each other for winning the loyalty of the child.This concept was proposed by Lidz(1963) but has also been invalidated as an explanation for schizophrenia

- **Subtypes of Schizophrenia–**

1. **Simple** –It is an uncommon form of schizophrenia. It has an insidious or gradual onset. The individual shows inability to meet the demands of the society and oddities of conduct. It shows usualy the **"negative symptoms" characteristics** of residual schizophrenia. But, these **symptoms"** characteristics of residual schizophrenia. But, these symptoms develop without being preceded by any overt or obvious positive psychotic symptoms.
2. **Paranoid**–It is the most common type of schizophrenia. A type of schizophrenia in which a person has an organized and relatively stable system of delusions and hallucinations. Disturbances of affect, speech, volition and catatonic symptoms are not usually present.
3. **Catatonic**–An uncommon type if schizophrenia characterized by prominent psychomotor disturbances and may alternate between extremes such as hyperkinesis and stupor.
4. **Residual**– A chronic stage in the development of a schizophrenic discorder in which there has been a clear progression from an earlier stage comprising of one or more episodes, to a later stage, with negative symptoms.
5. **Undifferentiated**–A type of schizophrenia in which no single set of psycotic symptoms dominates.
6. **Disorganized**–A type of schizophrenia characterized by confusion. incoherent speech and flat or inappropriate affect.

12.6 Management of Psychiatric Illnesses

- **Pharmacological**

Researchers have discovered since 1950's several effective psychotropic medications; medicines that can modify emotions and thought processes.

Anxiety Disorders–

1. **Antianxiety**–For example, Lorazepam, Diazepam, Alprazolam etc.

Mood Discorders

1. Antidepressant–

i. **Monoamine Oxidase Inhibitors.**
ii. **Selective Serotonin Reuptake Inhibitors**
iii. **Tricycle**

2. **Mood Stabilizers** –Lithium, Carbamezapine, Sodium Valproate.

Schizophrenia

1. **Antipsychotic–**

   i. **Typical–**These antipsychotics e.g. haloperidol, chlorpromazine, thioridazine etc. produce more ***extra-pyramidal side effects (E. P. S.).*** These stem from the dysfunction of the nerve tracts that descend from brain to spinal motor neurons. E.P.S. resembles symptoms of neurological diseases. Some **E. P.S.** are–***dystonia*** (*a state of muscular rigidity*). ***akathesia*** *(an inability to remain still)*

   ii) **Atypical–**These antipsychotics produce less E.P.S. e.g. clozapine.olanzapine etc.

- **Psychosocial Management**

The psychosocial management of the psychiatric illness may be based on various schools of thought, but all approaches essentially focus on the following aspects–

1. Correcting distorted cognitions
2. Developing an insight to the illness and self awareness
3. Developing autonomy
4. Trying to integrate social networks
5. Trying to develop health promoting life styles
6. Enlightening on the necessity of compliance to treatment
7. Developing the functional efficacy of the individual.

Unit 13 □ Drug Addiction

Structure

13.1 Introduction

No society is free from problem at any point of time. However the type of problems, depth and dimension may differ from time to time. There may be some problems, which do not last for long. The problem of drug addiction is one, which is a very old problem of many countries including India. It has posed a serious challenge to the world as a whole. Use of drugs is a century old practice in Indian society. During religious festivals and even in day-to-day life a section of people used various kinds of drugs. The juice of different flowers, leaves, roots, etc. was in use. Charas was also abundantly used, Thus it is not a recent problem, But in recent times it is considered as one of the serious global problems since number of drugs has multiplied, effectiveness of the drugs has increased seriously, the number of drug users is increasing everyday, the younger generation is becoming the prey of drugs and antisocial behaviour centering drugs has been increasing considerably.

13.2 Meaning of Drug/Drug Addicts

Drug is a chemical product, basically produced out of dust and juice of fruits, flower, leaves and other parts of some specific trees, plants, weeds, creepers, etc, There are synthetic drugs too, Drug is that item which, if used, can disturb the health and mind of the user and makes him/her totally dependant on that, Drug, in the context of our discussion here, are those chemical items, which are not permissible to use. If someone frequently uses any of those items without medical reasons, he or she becomes drug addict and is known as drug addicted.

13.3 Types of Drugs

Drugs are of many kinds, some of those are:

Marijuana	Morphine	Pethidine	Charas
Opium	Heroin	Speed Balls	Nitrazepam
Cocaine	Amphetamines	Methaqualone	Mandrex
Coffeine	Barbiturates	Diazepam	Smack
Cannabis	Hashish	LSD	Glue Sniffing
Brown Sugar	Librium	Dope	

The above mentioned drugs can be classified into the following categories–

(i) Narcotic Analgesics
(ii) Stimulants
(iii) Depressant
(iv) Tranquillisers
(v) Hallucinogens
(vi) Inhalants

The first category drugs minimise pain. The impact of drugs under other categories is understandable from the name itself.

The effectiveness of impact of all the drugs is not same. Whereas some are extremely strong, some others ae comparatively less strong and the rests are somewhat mild. Costs of different drugs are different. Some are not that costly, some are costly and others are not that costly. Demand of different drugs varies from time to time. If one is very much used during a particular time period, some other item can take

its place after sometimes. This up and down trend is a regular phenomenon in case of drugs.

13.4 Symptoms of Drug Addiction

There are numerous symptoms of drug addiction, Some of them are–

(i) The person concerned will lose interest in sports, studies, households work, cultural aspects, etc.
(ii) His/her biological need will be decreased
(iii) Personal life will be disorganised
(iv) He/she will speak irrelevant.
(v) He/she may do something that has no specific objective as such.
(vi) The eyes will loose brightness
(vii) He/she will start suffering from drowsiness, dullness, and sluggishness,
(viii) There may be spot of injection on the body as well as spot of blood on the clothes.
(ix) Feeling of uneasiness, pain on the body and vomiting will be marked.
(x) He/ she can't sleep for long hours at a stretch.
(xi) Sweating profusely is another important symptom of drug addiction.
(xii) Spends unusually more time in the bathroom.
(xiii) Loses capacity to remember anything.
(xiv) Can't concentrate. Mentality changes very fast.
(xv) Loses emotions and finer feelings.
(xvi) Family starts losing money, ornaments and other valuables.
(xvii) Blood pressure and movement increases.
(xviii) Liver and Pancreas will start developing problems.
(xix) Starts dreaming, ignoring the realities.
(xx) Skin-related problems will occur.
(xxi) Blood content in the body will decrease.

13.5 Reasons behind Drug Addiction

Any problem is the outcome of a number of reasons. The problem of drug addiction is not exception to it. A number of reasons or factors are responsible for the causation

of this problem. Some of the pivotal reasons are–

(i) ***Economic Drawbackness*** : Including drug addiction many social problems are directly linked with poverty. In a country like ours, a sizeable section of population is suffering from dearth of economic resources. The gravity of the problem is so acute that occasional starving , not daring to reach to the doorstep of the schools, not bothering to think about getting health services not dreaming to have a house to live in, etc, are the realities to crores of people scattered in different parts of the country. Such a situation does not generally help a person to think well and do well. This provokes the persons concerned to be involved in this or that kind of antisocial activities, of which drug addiction is one. They can be involved either in drug peddling or drug using or both. The result of a study conducted in a Drug Cure Centre based in Kolkata gives the indication that about one-third of the drug addicts belong to the lower income group families.

(ii) ***Disorganised family*** : Family, which is the basic institution in the life of any human being, can also responsible for creating this problem. If the environment of a family in unhealthy, or if it is broken /disorganised, its members, particularly the young one, get mentally disturbed. They lose interest in the family. Their socialisation process is hampered ; finer feelings are withered away. This may ultimately lead to valuelessness,lack of discipline, tension, aggressiveness, and destructiveness. In such a mental condition, there is no wonder that members of such families would opt for any antisocial act.

(iii) ***Peer Group*** *:* Friends are very valuable in the life of any individual . Sometimes their influence is much more than the parents, other family members or relatives. This is particularly true at the young age. But none is sure about the kind of friend he or she will get in the life. If the friend -circle of an idividual is not worthy. It is verylikely that he/she will be negatve influenced. Generally smoking, drinking , using drugs, eve teasing, criminal act are performed in groups , mostly the peer goups. Behind the drug addiction also, it is considered as one of the contributing factors.

(iv) ***Mental Pressure*** *:* It is almost natural that people will come under mental pressure every now and then. There is no escape from it. The reasons behind the mental pressure may be varied such as loss at business, unemployment, serious health problem, or death or near relative, failure in love, maladjustment between husband and wife, political pressure, chances of losing property, some unwanted case, being insulted by others, high demand of parents, compelled to do something which is not liked, etc. When such pressure becomes unbearable people may go for using drugs.

(v) ***For fun :*** At the younng age people become fun lovers. That I am becoming adult–this feeling itself gives birth to go for funs of various kinds including using drugs. At that point of time he/she may never think of becoming addicted. But the tendency to go for more fun by taking some drug for days together ultimately makes him/her addicted. Once he/she is tenpted to taste the effect of a particular drug, there is every chance to become the prey of addiction in due course.

(vi) ***The Social Situation/Life :*** The social structure, both in the rural and urban areas has undergone sea change in the recent past. The people have become more self-centred. Consumerism has gone high. Community feeling has weekened Communication gap between the neighbours themselves, parents and children as well as between the teachers and the taught have widened. Cheap enjoyment and erosion of valus of life has agravated the problem further. Pampering or neglecting the children is the practice in many families which leads to the young people to take shelter under the shadow of drug. Liberal pocket allowances coupled with easy availability of drugs are also contributing factor of drug addiction'.

13.6 Influence/Effects and Drug Addiction

Effects or influence of drug addiction is marked in many ways. Some of them are enumerated below

(i) It affects the economy of the country negatively.

(ii) Political stability and security or defence of the country may also come under note of interrogation.

(iii) Antisocial environment is created resulting thereby complicated social situation.

(iv) Rate of accidents is increased.

(v) Family life is disturbed seriously.

(vi) Wastage of human resources takes place.

(vii) The persons concerned lose health and creativity

(viii) Human qualities are lost.

(ix) Families become economically loser.

(x) The drug addicts and their families lose their social status.

13.7 Treatment

Like all other diseases, proper diagnosis is necessary in case of drug addicts also. For doing so, it is necessary to examine his health condition, mental condition, history of drug abuse, family environment, etc. Based on those data special treatment can be arranged in the Government hospitals, Nursing Homes, or health clinics meant for detoxification. Drug addiction is such a problem where both physical and mental treatment is necessary.

The process of detoxification is so complicated that only specialist doctors can deal it with. Naturally, the treament of drug addicts is both time-consuming and expensive. To get result of the treatment rendered by the physician and the psychiatrist, the patient should be kept under strict observation and should get due care. He/she should get appropriate assistance of support so that mental breakdown does not take place again. Based on the need, method of psychotherapy and counselling can also be applied.

The case of drug addiction has been steadily increasing in number, Though it is basically an urban phenomenon, the rural society is also not free from the problem. The arrangement of their treatment appears to be inadequate. Though during last few years the facilities for their treatment has significantly increased as a result of the effort made by the Government and NGOs, needs largely remainunmet. If the problem is to be addressed properly arrangements are to be multiplied. However, besides the infrastructural facilities, the patient needs the services and support of his/her family members. To help the patient to regain mental strength, to provide congenial environment and to stand beside him/her with patience and sympathy is the role of none but the family.

13.8 Laws relating to Drug Addiction

Since the problem of drug addiction gives birth to personal degeneration and social disorganisation, no country cn remain silent on the issue. Most of the countries, affected by this problem, have enacted laws to bring the same under control. In India also we have a number of laws to effectively fight against the problem. Under these laws, all the people related to cultivation/manufacture of drugs, drug peddling, sale of drugs and use of drugs are punishable. Considering it as a heinous crime, there is provision of long duration Jail Custody. If somebody provides land, house, vehicle instruments on rent, etc. for cultivation, storage, transferring, manufacturing drugs he will also be punished. Even for Licence holders, the licence can be cancelled if it

does not fulfil the conditions. The drugs unlawfully kept can be seized and searching of any or human body can be made based on definite information.

The laws have not been enacted in the recent times. The Opium Act 1857 and 1878, Excise Act 1909, Dangerous Drug Act 1930, Opium Smoking Act 1932 were introduced much earlier, keeping conformity to the new challenges necessary modificatios of the older laws have been made or new Acts such as Narcotic and Psychotropic Act have been passed. The Narcotic Control Bureau has also been established. Even Special Cell has been created in the Intelligence Bureau in 1989. All these are definitely helping to keep the problem under some control. However there is scope of implementing the concerned laws more seriously.

13.9 Rehabilitation

Already it has been discussed that Government as well as non-Government medical centres renders medical services to the drug addicts. NGOs also play some effective role. Some of such NGOs are 'Kripa', 'Dover Medical Centre'. "Institute of Psychological Educational Research','Bibek Bidhan Home', 'Baulmon', 'New Life'. 'Ashroy', 'Institute of Mental Health', etc. But in case of drug addiction treatment alone does not help. Rehabilitation is an integral component of the whole exercise.

The above-mentioned agencies cannot meet the total need in this respect. In fact it is basically the responsibility of the families concerned. If there are lapses on the part of the family, the patient's conditions can again be aggravated. Treatment and rehabilitation both the processes are complicated. Rehabilitation does not mean economic rehabilitation only. It is social and mental rehabilitation too. Though neighbours, friends, NGOs can play some role in this respect, one can easily understand that prominent role lies with the family.

13.10 Role of Different People/Institutions in Solving the Problem

Drug addiction is such a problem , which can destroy the normalcy of the society. Hence it warrants preventive and curative measures by different players to tackle the problem. But it is a serious issue and can't be dealt with easily. There are lot of very strong Cartels who dare to run the business throug out ht length and breadth of the country. Naturally it needs lot of planning and steps. So the responsibility in this context, to many which is analysed in the following paragraphs.

(i) ***Role of Gruardiant/Family***

Family is the Primary institution in the life of any individual. The responsibility of any human being lied with the family. Naturally influence of family is maximum in the life of a person. At the young age children want to age children want to know many things. They also want to say or express many things. The family has the responsibility of satisfying this curiosity, encouraging to express ideas and trying to know him. The family elders should keep constant touch with them. They should speak freely to the children to make the process of knowing each other possible. Parents of family elders should show interest in the work of the children and give them advice and encouragement. It is also essential to know his peer groups. The family elders should try to know the nature and depth of the problems that are common at this age and help to overcome the problems basically by counselling and guidance. Their life philosophy and life style should be such that children get help in their character formation. Parents should be such that children get help to overcome the problems basically by counselling and guidance Their life philosophy an life style should be such that children get help in their character formation. Parentrs should keep themselves free from any addiction.. They should remain desirous of meeting the mental need of the children. Neither the children should be pampered nor ignored. They should experience behaviour, which is just or appropriate. If the family elders make the family environment like this, it can effectively fight out many problems including drug addiction.

(ii) ***Role of Teachers***

The teachers also have an important role to play in controlling the problem of drug addiction. They can behave properly and normally with the students maintaining the required distance. By doing so the teachers can understand the personality type, strength, weaknesses and problems of their students. In that case necessary assistance and advice can be given.They can also enlighten the parents about anything that should be informed. But associating themselves in the activities and desires of the students they can guide them to decide the aim of life and adopting steps to achieve that. They can play positive role in involving them in constructive activities. The teacher can also play a definite role in controlling the problem of drug addiction by explaining the students about the problem of drug addiction.

(iii) ***Role of Neighbours :***

In the control of the problem of drug addicts, the neighbours also have some role to play. If in a given community interpersonal relations are maintained,. a congenial environment can be created, which is helpful in healthy development of children, problems like drug addiction can be controlled to some extent. Secondly

if anybody in the community finds anything wrong in the behaviour of any individual of the same community, he may himself tackle it or can bring it to the notice of some elderly persons of the family so that initiaitives are taken to bring back the person is normalcy.

(iv) ***Role as a Citizen :***

As citizen also people have something to do in controlling the problems by checking the cultivation of drug producing creepers/plants in the area. They can also keep vigil that drugs are not sold in the areas they live. If such things happen, they themselves can fight or inform the police or concerned office such a Narcotic Cell, Besides, they can help in the rehabilitation of the drug addicts particularly by helping them to adjust with the society concerned.

(v) ***Role of Voluntary Organisations/NGOs :***

The NGOs and Voluntary Organisations can also contribute in the minimizaion of the problem. In the urban as well as rural areas there is presence of good number of voluntary organisations and NGOs. Based on their capacities they are planning and implementing varietes of welfare and develoment related programmes. Their nature of work may be different but they can also play some role in tackling the sensitive an complicated problem like drug addiction. Their role can be direct of indirect . They can generte awwareness among the community people, organise protest rellies aginst his problem. work as eyes and ears of Police and administration and help in the treatment and rehabilitation.

(vi) ***Role of Police and Administration :***

Police and administrationare the powerful agencies to control any kind of problem including drug addiction. Laws have been enacted; infrastructure has been developed to bring this problem under control. But the above-mentioned steps are not the last word, In fact, that is just primary arrangement. These steps would be effective only if they are implemented with competence and sincerity. It demands honesty.proper outlook and strong determination. With the help of the above-mentioned human qualities, Police and administration can effectively fight against the problem of drug addiction.

13.11 Conclusion

The problem of drug addiction has become a serious global problem because of several reasons such as long-lived tendency of using drug,.formation of rackets with a view to earn easy money, absence of strong and intergrated, measures to tackle it,

etc. In several countries like Bolivia, Colombia, Ecuador, Southeast and South-west Asian countries drug items are generally produced. As regards the use of drugs, countries like U.S.A., Canada, France, Briatain, the then West Germany, India, Indonesia, Philippines, Malaysia, Pakistan, Afghanistan, Bangladesh, Singapore, Maldwip, Hong Kong, Fiji, Nepal, etc are at the leading position. Considering the depth, dimsnsion, and seriousness of the problem, it becoms essential to takenecessary action by each country individually, At the same time there should be integrated effort by allthe problem-ridden countries. Accordingly, all the countries are enacting laws and trying to implement the same effectivly. Organisations like United Nations and UNESCO are also playing their role. It is needlesss say that the professional social workers have some scope to play a definit role. They, naturally, need to play that role with all seriousness

13.12 References

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13.13 Exercises

1. What is the meaning of Drugs? Drugs are divided in how many groups? Explain the symptoms of drug addiction.

2. Why drug addiction is know as 'aboriginal inclination? Explain the reasons behind the causation of drug addiction.

3. For drug related problem, how much responsibility goes to the family and social condition? Explain the influences of drug addiction in the individual, family and sciety concerned.

4. What kind of treatment and laws are there to fight against the problem of drug addiction? Discuss about the role of different people and institution is solving this problem.

Section A ◻ Social Work Research

Unit 1 : Introduction to Social Research

1.1 Definition of Social Survey, Aims, Subject-matter and Historical Background.

1.2 Meaning of Social Research, Importance, Characteristics, Scope. The condition of social work research in India. The limitations of social work research. The difference between social research and social work research. The difference between survey and research.

1.3 The process of social work research, Meaning and concept, The selection of problems for research, literature survey.

1.4 Hypothesis formulation, meaning and concept, Utility, Testing of Hypothesis,

Determining ,appropriate test criterion characteristics of a good hypothesis,

Determining appropriate test cuitention, characteristics of a good hypothesis.

1.5 The outline of research, meaning, elements.

1.6 Sampling, meaning and importance, the rules of sampling, theories of sampling, importance of the process of sampling, methods of sampling, precautions in using sampling methods. Reliability of sampling, sampling errors and non-sampling errors.

1.7 Data collection

Methods of Data collection, Advantages and disadvantages, primary and secondary sources of data and their differences, the considerations for primary data collection, methods of primary data collection, processing and analysis of data.

1.8 . Report writing.

SOCIAL SURVEY AND SOCIAL RESEARCH

l.1 Social Survey

a. Definition :- It is very difficult to give a universally accepted definition of social survey. This is because the scope of social survey is very wide. So, generally any definition cannot suffice to express its aims. Actually, it is practically impossible to define the different applications of social survey in just few lines. This is because starting from

more or less eighty years from now, the classical poverty survey till modern-day survey of urban planning or market surveyor public opinion survey or surveys conducted by government offices have been so varied that it is really difficult to encompass all these types under one single definition.

Again, with respect to its aims, the scope of social survey has been very wide. This because it can range from implementation of administrative decision, from finding, cause-effect relation to shed light on some social theory. Moreover if we look at it as subject, then it may be inclusive of characteristic of population distribution social environment, different activities, opinion of social groups and the like.

Wells had delivered a definition of social survey in 1935 as primarily the expression of real cause of the poverty of labour class, their problems and social nature of it. But this is not a complete definition. In modern days, social surveys are used in wider meanings and contexts because on the one hand, it is attached to governmental suverys, market research, public opinion research and on the other, it is attached to different sides of social science research. Therefore social survey can be defined as scientific method by which the cause-effect relationship is understood, with an aim to realize the real cause of an event or to understand the source of a social problem.

(b) Purpose of social survey : Some social surveys aim at exploring some data delivering those to concerned people. In other words, such surveys have a clear descriptive aim. In the same way, as social surveys have descriptive aims for social scientist does it is a means of forming ideas about social relationships and social behaviour of members of society. In reality, different data' based subjects are included in its objective For example, how does different families of various status-positions expend their income, what is the relationship between education and social status, what is the opinion of general public towards social security policies, and many more such issues.

But it should not be believed that descriptions are the only aim of social surveys. Many social surveys also aim at explanation. Such surveys are completely theoretical. It means that, some surveys aim at formulating hypothesis on any theory of social science and then testing it or measuring the effect of theories on different issues. Whatever may be the aim of such surveys, it mainly aims at establishing relationship between different variables. This is why, such surveys require complex analysis and explanation.

From the above discussion, following can be summarized :-

(1) to uphold the relation between society and the elements of social organization.

(2) to search for reasons or causes of social problems.

(3) to analyse the cause-effect relationship of any social event.

(4) to analyse the different opinions of various social groups.

(5) to measure the effect of any sociological theory of society.

(6) to explore different data, analyse them and over and above create theories with the help of collected facts.

(c) Subject-matter of Surveys :

Though it is difficult to produce a complete list of subject-matters of social surveys but still four such subject-matters can be identified-

(1) To construct ideas about the distribution of a population for example, their family-structure, marital status, age, fertility-rate, ratio of children to aged population etc.

(2) To understand the social environment and economic condition of that population. It includes, occupation, profession, income, condition of living, social securities enjoyed etc.

(3) To construct ideas on the activities of that population. It includes their activities, behaviour, leisure activities, expenditure pattern, etc.

(4) To know about different perspectives and opinion of that population. For example, pre-poll survey, public opinion survey, market research etc.

(d) Historical Background of Social Survey :

The history of social survey is not very old. The names that are associated from the beginning are Eden, may how, and Booth. But, Booth is considered to be the father of scientific social survey. In 1886, Booth started a survey on The lives of Labour and Citizens of London and this survey ended in 1902. In the earlier parts of the twentieth century, Booth and Rowntree initiated many long-term social surveys. This is why they are called the torch-bearers of modern social surveys. In the later twenty years, many scholars also initiated surveys. Among them most noteworthy is Bowley. In the later decades of 1920s and earlier parts of 1930s, a number of survey were conducted in British Isles following the methods of earlier studies. Later on, urban planning and governmental activities were associated with survey. Slowly, the significance of survey increased and survey as a method also entered non-governmental sectors. In the mid twentieth century, academic courses of surveys started to come up and was included in the syllabi of various universities. In the U. S. too, alongwith British initiatives, various surveys were conducted. Among then, glock's work in 1967-Survey Research in the Social Sciences was published. In this book, the role of surveys in Sociology, Political Science, Psychology, Economics, Anthropology, Education, Social Work, Public Health and Medical Sciences, was vividly explained.

The Classical Poverty Survey :

The torchbearer of modern social survey Charles Booth started his survey in 1886 and concluded it in 1902. The results of his work was published in 17 volumes. He was a rich merchant and he felt deeply for the poverty stricken labour class and their social living, condition. The most difficult task which he faced during his survey was how to collect data on the huge population of the labour class living in London. He was the first to introduce "group interview" method. The data collected through this method was divided into eight classes of families. Out of these four were situated above the poverty line and the other four below it. But this differentiation was not too logical since, his difinition of 'poor' and 'very poor' was not perfect. But still this survey attracted attention because it highlighted on the terrible sides of poverty and its variation. Beatric webb later on had shown how much and to what extent, this survey had a political effect. In reality, Booths survey paved the way for scientific social survey.

After a decade later, Rowntree started his survey in 1902. The subject of his survey was "Poverty: A Study of Town Life". His survey was different from Booth's methods in three respects :

Firstly, he collected data on occupation, income and housing conditions of each labour class family.

Secondly, he directly gathered data from each family, and

Thirdly, the important issue of his survey was that he was able to present a nearly perfect conception of property. He was also able to differentiate between different strata of poverty stricken families. In his views if the total family income faulters to provide essentials to maintain the basic physical strength of the members then it can be called primary poverty. And, if the family income can provide the least essentials to maintain physical strength of its members, but cannot always satisfy important or unimportant expenditure of the family, it is called secondary poverty. He also, initiated a price index for food and clothing of (≠) such families.

In 1912, Bowley started a very important survey. He conducted the survey on the living conditions of labourers in five cities. The name of this survey was "Livelihood and poverty". The most important contribution of Bowley was the use of sampling. Later in this method was used in every survey.

In the 1930s, surveys were conducted in random and its use became tampant : In 1932, Ford conducted a survey in Southampton. This was published in 1934 as work and wealth in Modern Port Ford had followed Bowles' method in this survey but conceptualized poverty in different times. This new term was potential poverty.

The other surveys on labour class which were equally significant were Rowntree's survey

Poverty and Progress in 1941 and Lavers' Survey in 1950 and Abel-Smith's work in 1965. Rowntree gave up the earlier index if poverty and substituted it with a new one—human necessity value. Lavers' and Rowntree both conducted a survey named Poverty and the welfare state. Abel-Smith and Townsend conducted a survey named "The Poor and the Poorest".

Still today, surveys are conducted on urban planning, market research, public-opinion as done earlier. But in modern times, census is the most elaborate survey conducted so far. In every country, under government patronage census conducted every ten years.

Exercises

01. What is social survey? What are its objectives.
02. What are the subject-matter of surveys.
03. Explain the historical background of surveys.

1.2 Social Research

(a) Social Research : In general terms, social research is a deep concern for search to establish a new knowledge. Social research is research on Society-related any subject. Research is always conducted through scientific methods. The tools for this are experimentation, observation, data-analysis and decision. In natural sciences, experimentation is given more significance than is social science research. In social research on the other hand, observation, data-collection, data analysis is given more importance. In real sense, research is a process whereby existing knowledge is tested, modified by deep observation, analysis and decisions.

In 1947, Western Reserve University in the us conducted a workshop. In its report, it was said that social research is conducted to ensure the progress of pure natural sciences. But the characteristics that are found in social research are as follows :

1. Social research is conducted in social and behavioural sciences.
2. Such researches are also conducted in sociology and anthropology.
3. To clearly understand human behaviour and to make progress in knowledge acquired, or to reject an old theory, or modify it, or to establish, a new theory, such researches are conducted.
4. Social research is also conducted with an aim to help in formulating policies and to see it an idea on social issues is practically useable.

5. A social researcher starts his research with an educational aim and also to fill up the gaps in social science knowledge. The ultimate aim of such researches is to acquire unknowledge about social facts and social environment.

(b) Importance of Research in Social Work :

Social work is a practical profession. The scope of social work is mainly : Proposal, Promotion, Medical treatment of mental illness and over and above it is associated with, the positive aspects of social state. For this reason, it is important for the social workers to have a clear idea of different social problems and the reality. Because, the lack of it, the social researcher may find it difficult to construct an appropriate proposal and technique that would be a help for an individual or a group. Social research is for this reason helpful for social work. It becomes easier to find solutions to a problem and also find out the possible sources of a problem through research. In this way it helps the researcher to dwell deep into a problem and assist him/her in making a decision as to how and where to start their work. For example, let us think that cholerea has shaped up like an epidemic in a village. The first step a social worker should undertake is to find out what are the potential causes of cholerea; which castes or groups are most affected by it. Moreover, the history of the disease, the source of drinking water, opportunities for medical treatment etc. are also to be understood by the researcher. only after having a complete understanding of the nature of scope of the problem, he/ she will be in a position to draw a policy to solve it. But if an immediate solution to the problem is looked for, then it is advisable to take care of the medical treatment only. But in this way there will be ample scope for the disease to take the tony of an epidemic in the future. If a permanent solution is looked for, then alongwith medical treatment, efforts should be made to eradicate the causes of the problem. It means that through research, if a knowledge about the disease is formed, only then it would be possible to create a permanent solution to the problem. The importance of research his here. It is through research, that a social worker can develop a clear concept of the disease, causes of it and the socio-economic background of the patients. And this would had a permanent solution of the problem.

With the development of civilization, social life has become more and more complex. There has been important changes in the Social norms and regulation of earlier times. In order to understand this complex social environment it is important to survey the components of the social setting. It is also for this reason that research has become indispensible for the understanding of social complexities. This is because, unless the social workers can fully understand the social environment and the social facts, it would be impossible to carry on work for them. Whenever there is a disruption in the normal working of the society, social work research becomes essential. It is through research that the probable cause of such disruption are looked for. In reality, the aim of social

work is to find out the potential causes and solutions of the problems of mankind. It also aims at finding out alternative solutions that evolve out of the understanding of complex social problems. In summary, it can be said that the aim of social work is to build up an opposition to social problems and in this way to enhance the scope of social work and find solutions to problems. Social research helps social workers to practically use theoretical knowledge and help them to find out possible solutions to the problems they face. But, in reality social research and social work research are completely different subjects altogether.

(C) Features of Social Work Research :

There may be some similarities between social work research and social research but there are some characteristics of social work research, which are as follows :

1. The aim of social work research is to explore any answer to question related to social work through the application of structured scientific method. Besides, social work research tries to find alternative solutions to those problems which social workers face.
2. Social work research is not always directed towards enhancing knowledge in social science. It specially aims at finding out how this knowledge can be utilized for building up self-sufficiency and independence among people who are in trouble.
3. Social research aims at progressive enhancement of the works of individuals, group and over and above, the society.
4. Social work research is a part of social research.
5. Social work research is always oriented towards the reality. It emphasizes mostly on the practicality of the problems that men face and tries to find out possible solutions for it. It also aims at finding out the practicality of the methods used.

(D) Scope of Social Work Research :

The scope of social work research underlines the paramater within which social work is practically implemented. Its scope extends from establishing different theories of social work, research on various facts, policy formulation, implementation of different programmes practical utilization of policies and evaluation of policies and its control. In all aspects of social work research is essential. Due to changes in ideas, development of science and technology and differences between nature and culture, social work research alongwith changing social problems is undergoing revision.

Not denying the fact is the concept that social work has different implications in differing space and time. It is for this reason that implications of a particular research is not applicable universally. For example, changes that take place in a urban area does

not have same effect in rural areas. But it is true that the implications of development in urban areas have some effect on rural areas as well. It is for this reason that social work research is continuous and its importance can never be underestimated.

Areas in which social work research is immensely applied is policies-for social welfare activities, formulation of social laws and strengthening of same security polcies of some communities. Through this, there develops a deep bond of cooperation between the members of the society. In different areas, through social work research social justice and social security is easily established through such research the different gaps between different strata of people can be diminished.

(F) Position of Social Work Research in India :

Social Work as an academic discipline was first started in Tata Institute of Social Science. In the same way, social work .research also started in the sarn,e institute. But still, it is suffice to say that social work research has not gained momentum in India. The social work researchers in India still accept and depend solely on research methods, theories and techniques developed in the west. Indian social work researchers lack originality in their orientation. It is not true that research methods and techniques developed in the west are in applicable in India. But it needs revision while applying those on Indian conditions. Generally, it is seen that there lies a gap between the results of research and what common people think. Besides that, common people have very little knowledge about career in social work. The NGOs, government offices, international organisations, who do a lot of social work research, do not inspire social work researchers in any pure research. The type or research conducted by such organisations are so errorsome, that common people find it hard to integrate with them. It is for this reason that, though demand for trained efficient researchers are growing but still, the scope of social work research remains unchanged. The participatory research which are conducted usually entrusts its results on common people. But such researches should aim at hypothesizing after understanding the needs of the mass. Many times, such researches are conducted according to the needs of the organization which sponsors the research. Only in few cases, researches aim at the needs of the masses, evaluation of resources and importance of policy building. The reasons behind such errors in social work research are as follows :

(i) The administrators and policy-makers give less importance or research.

(ii) Insufficient financial resources are available for the research and the aims of the financial organizations or sponsoring agents limit the scope of research.

(iii) Lack of a central organization that would help in promoting social work research.

(iv) No real training centre for researchers.

(v) Lack of initiative among professional social work researchers. But in a country like India, where a substantial number of people live below the poverty line, it can play a viable role. The importance of social work research in India can be underlined below :

(1) **Social work research method :** Indian Social System is dynamic. Therefore, which social work research method is applicable in which social context of Indian society is very important to discern. The traditional methods of social work research used in Indian conditions are case work, group work and convey organization. There is importance in evaluating the success of each method. Because in the changing socio-cultural circumstances in India, these methods should be evaluated so that they can be more effective.

(2) Development of Policies, Integration and Evaluation : India has a number of tribes, castes and a number of people belonging to different classes. It is necessary to integrate the different social welfare works and evaluate these methods used. This is because, it is important to analyse the significance and the importance of collecting evidences for different demands. It is possible to develop varying programmes evaluate and integrate them only through research.

(3) Social problem oriented research : Different social problems such as illiteracy, superstition, poverty, unemployment, prostitution etc. are so complex that it is possible to understand them only through research. Besides them, problems of the scheduled castes and scheduled tribes, the unorganized labour force are only to be understood through research. Other than these problems faced by AIDS patients the negative reactions towards them also can be understood through research. Therefore, in order to understand any complex social problem social work research has an important role to play.

(4) To know the history of social work: It is impossible to understand the present without throwing the past. It is only by analysing the history of social work, we can understand the nature of its continuity of works already done. So, it is important for social workers to understand how changes in socio-cultural and political spheres has had an effect on social work. So, one of the important aspects of social work research is to enlighten on the history and its development.

(5) To understand Social Work and Social Policy: Many social policies are enacted for social work. It is important for social workers to understand the effectiveness of such policies at present and the success and failures of these policies. It can be understood only through social work.

Besides these, the importance of social work is understood in areas like administration, establishing human rights, training of social workers and in developing those etc.

(6) Limitations of Social Work Research :

Research answers questions on many unknown issues. This is why social research is called a pioneer of modern civilization. But the level of reliable data that research can yield for natural sciences, is some what jeopardised in case of social seicnce. This is the reason why there are certain limitations of social work research. These are :

(i) Many social work research is based on systems approach. This approach is based on human body. The parts of the human body perform certain particular functions. Any disruption in this working has a negative effect on the human body. This means there is an internal cohesion and mutual dependence in the working of the parts of human body. Similarly, if this logic is applied on research then it means that the data collected would try to find out ways to solve problems in such a way that it would match the modern social structure. But problem arises when it is inherent in the structure. This is how social work research begets its limitation.

(ii) The problem areas where social work research is generally conducted are not analysed deeply. As a result, in place of analysing the complex social causes, the researcher only explores some causes ignoring the others. This often happens because, the amount of labour and time needed for such work is not given. So, it lacks continuity.

(iii) The effect of India's regional differences is high on. social work. To do such work," continuous research is essential. The time and labour needed is often not adhered to.

(iv) The relationship between theory and research is significant. Though it cannot be denied that the social work theory and its applicability is universal but still its applicability is truly limited by regional differences. In respect to regional difference, modification of theories is also important but this aspect is not given significance by researchers.

(v) Many a times it is seen that there lies a misconception among researcher, financial institute, government office, and organisations dealing with social work. As a result of this, the policies taken up to consider needs of common man are not always accurate. As a result of misconception and biased ideas of the researcher, the results of research can also be misleading.

(vi) In Indian situation, behind different social work policies, are a particular impact of politics is envisaged. This political impact poses limitations on social work research.

(vii) Men hope that through research, solution to many human problems can be found. But this concept is not true in all senses. So, social work research too, cannot always bring success and help in meeting all kinds of demands, or bring about desired changes.

(F) Distinction between Social Research and Social Work Research.

In 1937, Helen Jetter in her book "Social Work Year Book" said that the aim of social work research is to find out social work philosophy, method, process, technique etc. for the problems faced by social work researchers, in a scientific and national exploration. Differently, though social work research aim at progress in fundamental social science. The theories of social science and methods are applied on social work and in this way, there establishes a relationship between the two. In reality, the main differences between social work research and social research is that social work research is always conducted from the point of view of the social worker. The differences between the two are as follows :-

The Subject of difference	Social Research	Social work Research
1. Definition	Social research is exploration of social science development through scientific and national methods.	Social work research is to find solutions to the problems social workers face, through scientific and national exploration.
2. Field	Social Research is conducted on behavioral sciences such associology, anthropology etc.	Such research is conducted on areas where social workers face problems.
3. Aim	to establish clear concepts regarding social environment, social problem, human behaviour, to reject any old theory, to reform or modify them. In short, to aim at knowledge regarding social Science research.	To understand the causes of the problems social workers face to find solutions to these problems, to examine the utility of social policies.
4. Scope	The scope of social research is very wide. Any issues of social significance are included in such research.	Social work research is apart of social research. As it is limited by its scope of working within the field of Social Welfare in comparison to social research, its scope is limited.
5. Basis	Social research works on the limitation of social science. Its aim is exploration of new knowledge.	The basis of social work research is to find solutions to the problems of human kind.

F : Distinction between Survey and Research :-

Though survey and research have some common areas but still they cannot be synonymous. In reality, survey is to analyse or explore on certain issues so that its true

nature can be highlighted on. Generally, survey is conducted to find out if a plan is researchable or not. On the other hand, to explore on a fundamental issue on the basis of scientific and rational criterion is research. Its aim is to find out sources of knowledge and rectify or modify old theories. If social survey is done explicitly that indepth social surveys can be called research.

Survey is mainly based on problems. To find art causes of any problem is the aim of surveys. It is on the basis of surveys that a plan is made and implemented. On the other side, it. is possible to know causes of a problem through research and find out permanent solutions to them. In social surveys importance is given to a fact and its discription. So, the result of surveys are temporary but the results of researches are permanent. The results of surveys and different recording to time space and persons on whom they and applicable. Therefore they are flexible and universal in the same time.

In case of research, specially pure research experiments are conducted. But the scope of experiments in surveys are limited. Surveys the primarily description and sometimes analytical. On the other hand, research is primarily normative. But in practice research is used as a term instead of surveys–as market research, public opinion research etc. These actually mean market survey, opinion survey.

Exercise :

1. What is the meaning of social research? Analyse its objectives and scope.
2. What is the difference between survey and research.
3. Illustrate the difference between social research and social work research.

1.3 Process of Social Work Research

Idea : Research is a continuous process. The process depends upon execution of specific work. These are like steps of a starecase who are interrelated. Scientific methods are followed to execute these work. On the other hand the steps which are followed in a scientific reasearch are not scattered rather they are interrelated and interdependent. As these steps are followed and executed in a definite way in a research work thus they are considered as research methods. The main steps of a research works are as follows :

1. To identify the problems of research.
2. (a) Discussion of various theories and concepts.

   (b) Gathering knowledge on similar kind of research.
3. Project preparation.

4. Draft sketch plan of the research.
5. Collection of data.
6. Analysis of collected data.
7. Detail explanation of information based on the data and preparation of project report. But depending upon the requirement these steps can be changed. In case of social research similar steps are followed. Since the social research are done to solve the problems faced but the social workers and emphasises on the problem itself that is why these kind of researches are very much problem specific. Thus identifying the problem is the initial phase of this kind of research, similarly report with recommended solutions to these problems are the last phase of these research. The intermediate phase of the research work is considered to correlate between the two phase. This is the most critical and major part of a research work. In this phase so many works needs to be done such as sketch plan of the research, tools for the research, to determine the source of data and information which are to be collected, collection of data & Information data analysis, project preparation, examining the project, Analysing of the information etc.

(B) Identification of Research Problem :

Problem of a research means to determine the solution to those problems through research. Therefore identification of research problem means the research worker will research on what to find a solution-that means to identify or ascertain the topic of research. The researchers has to discuss thoroughly the theoretical and practical side of the problem so as to understand them properly. For this they have to read specific problem related books as well as to talk who such persons who have experience and have worked on similar kind of problem. This way after identifying the problem then the research methodology is to be settled. Therefore it need various works to be done identify a problem. The good thing that are obtained by identifying a problem are;

1. To ascertain the sphere of the topic of research.
2. This specifies the topic of the research and makes the research work smoother.
3. The problem can be properly defined.
4. To differentiate between the relevant (Research related) and irrelevant data.

Identification of Research Problem is basically to determine the topic or subject on which the research work will be carried out. This mainly depends upon the discretion of the researcher as well as the knowledge and proficiency of the researcher, on a particular subject. Thus it is the primary job of a researcher to select the subject area of his research. Otherwise it is not possible to reach to the goal of the research. For this he has to perform the following ;

1. The researchers have to decide the subject on which he has sufficient knowledge or among the various problems of the society which one attracts him the most. For example a researcher may choose. 'The malice of addiction' as his subject of his research. In this case the sphere of research is quite large, because cigarette, alcohol, Opium, Ganja, various drug they fall in the range of adict substance. Therefore he have to decide among these which will be his choice of research, whether he wants to carry out the research on smokers or alcoholic or drug adict.

2. Once the topic and the subject is selected then it is advised to make it precise. In that case it becomes easier for the researcher to put light on a particular side of the problem such as if a researcher decide to carry out the research on alcoholic person then he can make it more precise as whether he wants to study the health related problem with an alcoholic person or the society related problem with an alcoholic or the role of alcoholism as a cause behind the diplorable condition of a family.

3. After this the researcher has to determine the goal and mission of his research. Because the mission of a research helps the researcher to reach his goal in a disciplined way. Due to this the researcher none other but only concentrates on his research.

Apart from the above steps the researcher has to follow other rules which are as follows.

i) The researcher must exchange his views and ideas with other research fellows and interact with those persons who have experience on similar kind of work. This will make the research more specific and effective.

ii) He have to read books and journals relected to the said research this will make him more knowledgable.

iii) The researcher must have attraction on which he is carrying out the research work and he should have fairly good conception about the research, which are already done in the same field.

iv) It is always recommended to avoid such fields of research which has a wide area and easily attracts the researcher.

v) Above all the problem of research, or the subject has to be viable in respect of time and money.

(c) Review of Literature

After selecting the topic of research the second phase of the research requires that the researcher should gather in depth knowledge about the subject unless the researcher have a clear idea about the nature, cause and depth of the problem, he cannot carry out the research in the right direction. Reading of books helps him to build ideas, learn theories etc. It gives proper direction to the research work and prevents duplication of the same.

It also indicates about the problems that may be encountered while doing the research. Study of books does not only mean studying of published books, but it includes study of unpublished books, journals, magazines, articles, Govt. reports etc. The research should make a list of these materials, because at the end of the research the reseacher has to declare about the references from which he got help in preparing the thesis.

Exercise :

1. What are the major steps of a research.
2. Why the identification of a research is required and how is it done.

1.4 Formation of Hypothesis

(A) Idea : Hypothesis means one or more proposals that are placed to explain a topic. This may be a simple assumption that sets the direction of an exercise or any established that which helps to determinate the probability. When a hypothesis is formed on the basis of an established fact then the authentication of the hypothesis is judged. Most of the time a hypothesis can be examined or judged scientifically.

At the time of examining the hypothesis the correlating between the independent variable and dependent variable (?) is considered. For example it is noticed that the students of those schools and colleges are successful and more productive in their professional life who got the proper counselling about selection of profession during their student life. Here independent variable (?) is 'Counselling' on profession and dependant variable (?) is productivity in his professional field.

The definition of hypothesis in webstar dictionary states 'It is a proposal or proposition a situation or discipline which is probably assumed without having any proof. Whose objective is to establish an acceptable basis of the hypothesis and examine the correlation between the fact and outcome of the hypothesis which is determined and established through research.

A hypothesis is rated very much useful if it is precise and its objective is clear. Though the hypothesis is considered to be essential element for research but this is not true in all the spheres of research. For example it is not required incase of discovery related research. But when a problem oriented research is carried out then one or more hypothesis is very much essential, because they point out the reasons behind the problem and correlates them with the probable solutions. Generally hypothesis are of two types 'null hypothesis' and 'alternate hypothesis.' Null hypothesis are expressed with Ho and alternate hypothesis

are expressed with H_1. Null hypothesis are prepared to examine the alternate hypothesis. A Null hypothesis states just the opposite or reverse of alternate hypothesis. Therefore if the null hypothesis is discarded / rejected on the basis of collected information then the alternate hypothesis is accepted.

(B) Utility : The utility of hypothesis in a research work can not be denied. Following are the utility of hypothesis :

1. Hypothesis helps the research to move in a right direction.
2. It helps the researcher in many ways such as what kind of information is to be collected, how the information will have to be analysed and presented to draw an inference.
3. Hypothesis helps the researcher to draw a specific inference as well as it brings transparency in the research work.
4. Apart from the above the hypothesis help the researcher to select the methodologies for experimenting the information.

(c) Test of Hypothesis : Test of hypothesis is one of the primary and essential job of research. After formation of hypothesis the legitimacy of the hypothesis is tested. This taste depends upon the following steps-

1) Formulation of hypothesis : Formation of hypothesis is the basic work of a research. It is already mentioned that there are two types of formation of hypothesis—Null hypothesis and alternate hypothesis. The following example will help to explain their nature. Suppose a drug manufacturing company wishes to bring a new medicine in the market. Now the reaction of this medicine has been observed on a group of people and accordingly the compnay has to decide whether the medicine will be marketed or not. Now to assertain this experiment certain parameters have to be set and assumed, this assumption is hypothesis.

So at the beginning you have to consider a null hypothesis. Let the hypothesis be H_o : P = 100 where P is the number of person on whom the reaction of the medicine will be observed (Population Parameter)

Now an alternative hypothesis is to be experimented where H_1 : $P \neq 100$

Based on the collected information the null hypothesis have to be tested and if it is found to be not upto the mark of acceptance then this will be considered as rejected or discarded. If the null hypothesis is discarded then the alternate hypothesis is accepted and in the other way if the null hypothesis is accepted then the alternate hypothesis stands to be rejected.

2. Setting up a suitable significance level :

There are possibilities of two types of error in case of accepting or rejecting a null hypothesis. They are—

i) Type I error : When the null hypothesis is rejected but it was actually correct, and

ii) Type II error: When the null hypothesis is accepted but it was actually incorrect.

The significance level means probability of making Type I error while testing of a hypothesis. Generally the percentile of this error is 5% (i.e., a = 05). This means when an inference is drawn after testing of a hypothesis still there is always a chance of an error. Though sometimes the value of a is assumed as 1% (a = 0.1) But it depends upon the preference of the investigator and the sensitivity of the subject of research.

(D) Determining appropriate test criterion :

A proper experiment methodology or appropriate test criteria is determine to judge the authenticity of the information that are collected to perform the research. Generally this depends upon the nature of the collected information. Some popular methods are—

i) Normal distribution—This test is very much effective and useful where the sample is more than 30.

ii) t-distribution-this test is performed where the sample is less in quantity.

iii) Apart from these F-Test and Chi-square test is used.

4. Decision making :

The mean / average is taken after sufficient tests and it is then compared with the result of the normal distribution table. It the test result is higher than the result of normal distribution table then it is considered as null hypothesis it is rejected. Now the alternative hence hypothesis is accepted. Opposite to this the null hypothesis is rejected.

E. Characteristics of a good hypothesis :

Following are the characteristics of a good hypothesis.

1. The hypothesis have to be precise and explained in a simple language.
2. The hypothesis have to be possible for testing.
3. In case of relational hypothesis there should be a clear explanation about the variables.
4. The scope of the hypothesis should not be wide. The more it is limited the easier is to test the hypothesis.
5. The hypothesis should be expressed is very easy language so that everybody

related to the hypothesis can well understand the substance of it.

6. The

7. It is essential that a well defined hypothesis can always be tested within a legitimate time.

Exercise

1. What are the reason of formation of hypothesis and why they are essential.
2. Explain the merits of a well defined hypothesis.

1.5 Research Design

A **Rationale :** The Research design helps to test the hypothesis. It is the orientation of data which are collected and analysed,–so that the goal is reach easily. The research design clearly indicates about which step is to be performed and when to perform in a research. It gives a direction to the research. The research design helps the research to be more objective and right directional. This eliminates the chances of unnecessary work and ensures to obtain accurate results of a research. Actually it is the conceptual part of a research through which a research is carried out. In other sense it is a future plan for a research work. The design is dependent upon the objective of a research. Therefore if the type of research varies then the design of research also changes. This means different research has different design. There is no such standard research design which can be followed for every research. But this is true that the sketch design or the draft design is more or less remains same.

B Components of a Research Design

Research design means the layout which the researchers draws in the preliminary stage of a research. It is mainly the execution procedure which is planed in advance. It is always very concept and subjective. Before tinalising the design the researchers has to take certain decission, they are

i) About the subject of Research - What will be the subject of a research? This has to be explicitly mentioned in the introduction/preface of the research paper.

ii) Reason of Research - Why the research should be carried out?

iii) Place of Research - Where the research will be performed?

iv) Data and Information - The research related data and information will be collected from where?

v) Research Time - How long the research will be performed? What is the time limit?

vi) Research Sample-What is the periphery of the research from where the data and information will be collected?

vii) Collection of data-Which methodology will be considered useful for collecting data in the research?

viii) Data analysis -Which methodology will be most effective and accepted for analysis the data?

ix) Presentation - Finally the writing technique of a thesis is to be determined for proper presentation of the research.

The finalisation of research design depends upon the satisfactory answers to all the above queries. When a researcher finalises all the above points then only the designing is possible. Following are the different components of such design :

(1) Problem :- While designing the research the problem have to be properly defined and included.

(2) Nature of Research :- The design should properly explain about the nature of the research i.e., whether it is an experiment oriented, or narrative/descriptive or theory based or any other kind of research.

(3) Objective:- The design must state the objective of research. If a research has various objectives then the main objective and other aims of the research should be clearly stated in the design. Generally a research should not have more than six (6) objectives.

(4) Main Theme :- The main theme of the research should be included in the design.

(5) The Research Sphere :- One of the important component of a research design is to state the sphere of the research. The significance of the research must be clearly mentioned in the design such as why the research is being carried out? How does the research will inflate and enrich the knowledge world? Which goal will be achieved by the research? Along with this the field of data collection i.e., the source and volume of data as well as sample is also mentioned in the design.

(6) Data Collection :- The most important port of a research is data collection and making decision after analysing the collected data. The research design contains detail plan on this. Following are the components related to data collection and analysis that are mentioned in the Research design :

(a) Detail description of the source of collected data.

(b) Description of the method and processed which are evolved in data collection.

(c) How the data will be collected - such as; whether will it be collected by personal visit to houses or from a specific place, when will be the collection work performed, whether in the morning or in the evening what would be the arrangement to collect primary and secondary data etc.

(7) Data Processing and Analysis :

Finally, how the collected data will be processed and presented that is also mentioned in the Research design.

Exercise :

1. Explain the components of a research diagram.

1.6 Sampling

A. Idea and Importance : Sampling is very important in a research work. There are two methods which are followed to collect data. Data can be collected ftom all the sources or few representative sources may be identified and then the data be is collected from that source.

When the number of sources are very high and the periphery is also very wide spread then the second method is followed. All possible sources are termed as 'population'. But it may out be always possible to collect data from this 'population'. But it may not be always possible to collected data from this 'population', because it becomes almost impossible to meet the expense and give necessary effort to this work for a researcher. Apart ftom this, it also becomes quite difficult and complexed for a researcher to properly momage, analyse and explain such huge volume of data. Generally a small population that represent the actual population is selected and fron here the data, is collected, This selection procedure is called sampling.

Suppose a research will be done on the slum dwellers of Rajabagan area in Kolkata to ascertain their socio economic status. Suppose 10,000 family lives in that slum then the population for data collection will be 1000. Even though it is quite difficult, expensive as well as time consuming andliaborious to collect data from these 1000 family. So to minimize his work load the researched will select 1 family in every 10 family out of this 1000 family which sums up to a total of family trom where he will collect the relevant data. The process of selecting the 100 family out of 1000 family is called sampling. Although the researcher can not choose this 100 family as per his discretion. Specific rules are followed during selecting the family so that the selected small population can correctly represt the entire population. Otherwise the desired result can not be obtained from the research. The research becomes ineffective.

Sampling is a very important, extensively used and popular aspects of a research. This helps the research work to be more easier and faster. It has its own merit and demerits. If the small sample can not correctly represent the entire population then their is each always a chance of failure of the research work. That is why selection of sample is done very carefully and continously, some special statistical techniques are used. These me called sampling techniques.

Therefore sampling may be defined as. 'It is to select a portion of the entire source of data in such manner so that the inference can be drawn based on this sample. In this

process a survey is conducted on a portion of the total population and then it is decided whether to take them as sample or not In research terminology this population is called universal. But the term population is very popular and widely used. The population may be definite or indefinite depending upon the number of components. For example the number of books published .by a publisher is finite but the number of reader of that book is not finite, rather it is infinite. The infinite population can be divided into two from another view point - 'Real' and Hypothetical or Imaginary. As example the number of employees in an organisation is finite but their inspiration factors are imaginary because nothing can be said for certain in this regard. A researcher should have a clear conception about sample, which are as follows.

i) Sampling design : It is a specific plan regarding sampling so that the representative sample can be obtained from the population. It is also to be determined that what kind of statistical approach should be taken to draw the design.

ii) Sampling distribution : In some cases where more than one sample is taken there the statistical mean, standard deviation, range, correlation etc. or each of the sample is considered. All these value of a sample is then listed and thus sampling distribution is done. The reliability"(confidence) level of a sample is assessed through sample distribution.

Suppose a researcher sets the confidence level of 95% in that case it is assumed that out of 100 sample, 95 of them correctly represents the total population. Significance level tells the opposite to confidence level that is some of the sample naturally does not represent or support the entire population. Thus confidence level and significance level complements each other. The sum of two level is always 100. Hence if the confidence level is 95% then automatically the significance level becomes 5%. Therefore 5% significance level proves that out of every 100 samples 5 of them does not represent the population.

iii) Sampling errors : As the sampling is made with a portion of huge population therefore one cannot expect that the sample will always correctly express all the characteristics of a total population. There is always a chance of sampling error, it is often noted that even after; making two or three samples from same population produces different results. This difference is called 'sampling errors' on the other hand errors that occurs in data collection and analysis are human error hence they are known as non sampling error.

B. Rules relating to selection of samples : The relase that are followed for selection of sample are like – if the topics are set at random and are more in numbers than that of the total population then they may represt the population almost with no-error. For examples if 1000 leaves of a tree is randomly plucked and measured then it may be seen that the average length of the leaf will be almost near to the length of all the leaves of

the tree. The following two points are very important in case of statistical analysis.

i) The large the size or volume of sample the more it can represent the population. The equation is Dependancy on sample α $\sqrt{\text{Number of topics included in the sample.}}$

From the above example we can say that if 500 leaves were plucked invested of 1000 leaves as sample then dependancy/reliability of sample would decrease.

In 1st situation the dependancy on sample = K $\sqrt{1000}$ (K is constant)

2nd situation dependancy on sample = K $\sqrt{500}$

Therefore in the 1st case the value of dependancy is 31.62K where as in 2nd case the value is 22.36K.

ii) Sample selection must be done at random.

As per the abovementioned rule a portion of a large population is able to express the characteristic of the entire population. But lack of time, find and effort prevents to collect the data from the entire population and due to this random data collection has been the most conventional method. This rules supports the idea that if data is collected randomly then there is a chance of inclusion of all the traits and attributes of a lage population in equal population.

At the time of sample selection few cautions must be followed. The selection have to be unbiased. Otherwise if there is any mistake in sample selection then it can not properly express the characteristics of the entire population. So the sample must be alike with the actual population. If more topics are included in the sample then as per the law of inertia the chances of error is reduced and the same is increased in case of small sample.

C. Theory of Sampling : The selection of sampling (Theory) means the way to bring out the interrelation between the sample and its original population. The theory of sampling helps to have an idea about the large population at the same time it helps to correct them. Following are the joints based on which the sampling theory is evolved :

i) **Statistical estimation :** The sampling theory with the help of statistical estimation enables to derive some unknown characteristic of a population. This estimation can be of two types - point estimate and internal estimate. In case of the first type the result is expressed by a single number and in the second case the result is expressed by an expansion which has an upper and lower limit. For example in a sample of 10 spare parts 1 found defective, therefore it may be assumed that out of 100 such sample the number of defective parts will be 10. When more than one sample is tested in similar way then on this basis it may be expressed that the probability of defective parts may vary from 8 to 12 out of 100.

ii) **Testing of Hypothesis :** The second objective of sampling theory is to test the hypothesis and then either to reject or accept. This theory help to determine the logic behind the difference of results as whether it is just due to chance or the difference is really significant when the hypothesis is tested.

iii) **Statistical Inference :** This theory helps to draw inference about the characteristic of total population from the sample. Apart from this it helps to draw correct inference about the population.

D. Importance of sampling techniques : Sampling techniques are extensively used in case of quantitative research. It is also important in the other spheres of research. Sampling techniques are used in the field of education, Economy, Commerce and scientific research. In fact in our day to day life we follow some sampling techniques, because at the time of buying vegetables and daily commodities we take decision just by testing some sample of them, we don't test the entire quantity. For example, the pathologists tests only 1 or 2 drops of blood to draw inference about any disease. Therefore sampling technique is not only followed in case of research but it is followed in our daily life. Following are the significant reason for which shows the importance of sampling techniques.

i) **Economy :** It is quite expensive, time consuming and laborious task to analyse all the aspects of a population. This can be reduced and controlled through sampling techniques.

ii) **Reliability :** If the characteristic of a population is not heterogenous and the sampling is done with proper precaution then the sampling result should able to correctly reflect some special characteristics of the population therefore the sampling becomes fully reliable.

iii) **Detailed study :** As the sample contains lesser amount of elements therefore they can be studied deeply and in details. Since the sample is tested trom different angle, hence chances of error in the result is much less.

iv) **Scientific base :** There is a scientific basis of sampling techniques. Sampling is done trom the entire population in such a way (impertially) so that the sample remain unbiase.

v) **Suitability in most situations :** The study which are carried out for a research work are mostly sample study. Conducting a study or survey on an entire population is a very rare case, because if the there is a similarity in characteristic of a population then there is no deviation found in the sample too. Therefore in most situations sampling techniques are followed. It is true that though in case of research work sampling techniques is widely followed but it is not applicable in all sphere. In the following areas sampling techniques may not be effective, following are the areas where this technique is very

much effective.

i) **Data is vast :** When the population for research is huge and required volume of data is also vast in such cases sampling techniques is very much essential. It not only saves time, money and labour but reduces the complexity of the research.

ii) **Where cent percent accuracy is not required :** There is no alternative of sampling techniques where cent percent error tree result is not required from die research.

iii) **Where census is not feasible :** Generally cent percent accurate result is possible to get on studying all the elements of a population for research. Where census is not feasible in those cases sampling technique is considered as the only solution. For example if the total quanity of mineral and ores of India is to be'measured then it is not possible to dig all the mines and measure the quantity. So there is no alternative way than sampling techniques.

iv) **Homogeneity :** If the overall characteristics of a population is same then it becomes easier to use the sampling techniques and the obtained result is accurate.

This is quite true that if the sampling is faulty then the research result will also be confusing. For example if the per family expense of slums dwellers is the subject of a research and at the time of sampling the data is collected from only those family who lives in a concrete house then the obtained result will be in correct, because while preparing the sample, the family who does not have a concrete house were not included.

So it can be said that sampling techniques will be successful only when it is done with proper precaution and without any biase. If the elements are collected with direction then chances of error in the result becomes very high. Therefore it increases the chances of failure of a research. Hence it is advisible that selection of sample should be done scientifically and carefully then only a research work may be carried out.

(E) **Methods of sampling :** It becomes very effective to work with a small sample which is derived from a huge population. It was mentioned earlier that sampling method should be scientific it has to have, a scientific basis and it should be able to represent the entire population. Otherwise there is a chance of deviation in the research. The sampling method is divided into two parts, they are :

i) Random Sampling method.

ii) Non-random Sampling method.

i) **Random Sampling method :**

According to this method when sample is prepared from a large population then it includes all the elements of the population. This kind of selection is always unbiased. That is the sampling is not influenced by the persons likings and dislikings. The elements of

these sample are called indiscriminately from the population. This method avoids personal preference. The merits of this method are as follows :

ii) Potential sampling gives an idea. The assumption are unbiased and neutral.

i) The potential sample and its effectiveness does not depend upon the details of the information.

iii) In those research works where there is more number of samples are obtained by this method, there the relative potentiality of every samples can be assertained, which is not possible in other by other methods.

The demerits of this methods are :

i) Selection of sample depends upon the skill and experience of the person.

ii) It requires enough time to prepare the sample. Without preplan the sampling can not be done.

iii) This relatively a costly method. If the sampling is done unbiasedly then the cost may proportionately reduce.

Type of probability sampling

There are four kinds of probability sampling. They are :

1) Simple random sampling

2) Stratified sampling

3) Systematic sampling

4) Cluster sampling.

The above four are discussed below :

1. Simple random sampling :

When all the elements of an sample is selected unbiasedly then it is called simple random sampling. The significance of this sampling is that the sample contains all the elements of the population from which it was taken.

Here importance is not given to the personal choice of the researcher. It can be said in another way that if a sample is prepared with 'n' number of elements and if the sample includes as many as possible combination of 'n' number elements then this method is called simple random sampling. Follow are the areas where application of this method is often seen.

a) Lottery method

b) Tipet's number method

c) Selection trom sequential list

d) Grid method

Let us have a preliminary idea about all the above methods.

(a) **Lottery metbod :** In this method, at first all the elements of a population is segregated and written on separate piece of paper, then they are kept in a container. The pieces of paper are then mixed and well shaken there after each of the pieces are picked. All the elements written in those pieces are included in the sample. This way the number of pieces are taken out depending upon the number of elements of a sample. This is called the lottery method.

(b) **Tipet's number method :** This has been named after the name of L.H.C. Tipet. Tipet prepared a table with 4 digit where all the number were unbiased by written. An unbaised, impertial sampling can be produced from this table. For example if some one wants to prepare 50 samples out of 500 population then trom any page of Tipets table he can choose first 50 numbers. The test result showed that sampling done through this method is quite dependable.

(c) **Selection from sequential List :** The elements of population is listed in a sequence. The sequence may be done on the first alphabet of the name, or may be done Geographically or just serially. The elements that are oriented in this method, can easily be included in the sample and the selection may be started from any point. For example, if a sample consists of 10 student of a class where the total number of student in 100 then this may be done based on the roll number like 5,15,25, 95 or 10, 20, 30, 100 likewise.

(d) **Grid system :** This system is followed in case of area wise sample selection. In this system at first a complete map of the area is drawn. Then a rectangular screen is placed on the map and some rectangles are unbiasely selected. The areas in the map that are indicated by the rectangles are then included in the sample.

Merits and demerits of simple random sampling.

Following are the merits of this method :-

i) The method is relatively simple and the researcher need not have to be very much attentive as to which element is to be included and which one to be excluded in the sample.

ii) Since this is an unbiased method so chances of human error is nil.

iii) As the chances of inclusion of all the elements in the sample is equal therefore the sample can well represent the entire population.

iv) Since this is a disciplined method therefore if there is error in the results they can

be easily corrected.

Follwing are the demerits of the method :-

i) This method is not applicable when the size of the population is large.

ii) In this method the selector does not have any control over the elements of a sample. As a result the range of selected elements may be quite wide and it becomes impossible to keep control over each and every element.

iii) This method becomes ineffective if the population is heterogeneous.

2. **Stratified sampling :** At first the entire population is divided into number of classes, and each class is considered as strata. The significance of this method is that, that emphatically the population is divided into number of subgroups and for stratification some precautionery measures are taken as per the following.

i) **Proportionate stratified sampling :** In this method the proportion of elements in a sample is same with the various strata of the total population. For example if a population evolves 5 strata then from each strata 5 joints are identified and included in the sample. So in both situation the ratio is 1.5.

ii) **Disproportionate stratified sampling :** In this method equal number of element is selected to preapre the sample. This method is also known as controlled sampling.

iii) **Stratified weight sampling :** This method is applied where the size and volume of the strata differes from the original population. According to this method initially equal amount of element is selected from the strata, and their weighted average is calculated. How much weight is to be put on to which strata that depends upon the proportion of total population and the size of the strata. This is known as stratified weight sampling method.

Merits & demerits of stratified sampling method :

Following are the merits of this method :

i) The selector have more control over the selection procedure, because in a simple random sampling method there is always a chance that some important sample may not have all the elements which is almost absolutely nil in case of stratified sampling method.

ii) Samples can be prepared with a small number of elements in such cases where the statra are of similar nature there the sample are prepare with very little amount of elements even though there is no deviation the results.

iii) Another significant advantage of this method is the inaccessible can be replaced with the accessible aspects.

The demerits of the method are as follows :

i) This method has been developed based on the stratification of population. Therefore if there is any fault in stratification the sampling will also be faulty.

ii) Scientific method is not properly applied while stratification. It depends upon the personal decision and choice of the selector to prepare the strata. Therefore there is always a probability of biasness, which poses problem in future.

iii) In case of stratified weight sampling method if there is a difference of weight assigned to various strata then there is a chance of deterioration of the quality of the sample.

3. Systematic sampling :

This is another version of simple random sampling method. In this method the elements of a population is initially organised in such a manner so that all the elements a properly distributed in the table. The Voter list,. the Telephone directory these are the ideal example of this method. Suppose a sample with 50 elements is to be prepared out of a population that consists of 500 elements. In this situation we can select a number between 1 to 10 let us assume that the digit is 6 then the sample will be prepared based on the matrix 6,16,26,36,....., 486,496 likewise. This is known as systemetic sampling method.

The significance of this method is the selection of elements of a sample is done in a particular sequence. All the elements maintain equal difference. But the reliability and dependability of the sample depends upon their position in the table.

Following are the merits of this method :

i) Sample preparation is easy :

ii) This method is effective on every sphere of population accept the extinct population.

The demerits of thus methods are :

i) If the difference between two element are very high then the effectiveness of the sample reduces. Therefore it is not useful in case of preparing small sample out of a large population,

ii) The quantity of error increases if more than one strata is present in the population.

The other demerits of this method are :

i) If the elements of the population is not oriented properly in the table, if they have a tendency of becoming restless instead of being stable, then it cannot correctly reflect the characteristics of the population.

ii) The possibility of error is very high in this method if the stratification has a good influence on the total population.

iii) The elements are selected from the table based on their consistancy. In this way if the difference between the elements are very high then the sample can not be considered as an ideal sample.

4) Cluster sampling :

This method is also known as multilayer samplings, because in this method the preparation of sample is done through various layer and steps. This method is extensively used while preparing a sample from a huge population. Generally the sampling is done in three or four stages. At the first stage the initial classification of the elements are done and in the second stage they are again divided into subclass in the third stage the sample is prepared with the first, second and third graded elements.

This method is comparatively complex in respect to the other methods. An example may clarify the method. Suppose a sample of 100 prefessors is to be prepared who teaches in the colleges the score affiliated by the University of Calcutta. Suppose there is a list of professor which has 100 number of pages and each page contains 20 names which are alphabetically sorted. Now 20 pages are chosen unbiasedly out of 100 pages then from each page 5 names are randomly chosen. Therefore to choose 20 pages out of 100 any number between 1 to 5 is to be choosed first, suppose the number is 4 then the order of the selected page will be 4,8,12,16,.....96 and 100. After this if 5 names are taken randomly from each page then a sample of such 100 names will be prepared. Therefore this is a true example of combination of systematic sampling and random sampling method. But this method is not very widely used, because the method is quite expensive and it is difficult to keep control over the non sampling error.

Non-probability sampling methods :

We must have an idea about non probability sampling method along with side by side probability sampling methods. In fact the method which is incapable of preparing samples with all the elements of a population is known as non-probability sampling method. In this method the elements are non taken randomly. In another way, this may be said that while sampling it partly depends upon the personal preference of the selector, this means that in this method the probability of inclusion of an element in a sample depends upon the convenience and consideration of the individual. This sampling method is again divided into three parts :

i) Judgement or purposive sampling

ii) Convenience sampling

iii) Quota sampling.

i) Judgement of purposive sampling : This methods completely depends upon the consideration and personal preference of the researcher. Though the researcher tries upto the best of his capability to make the sample a true representative of the entire population. Even then the sample is dependent upon this judiciousness.

When a small number of element is taken from the population to prepare a sample, then thus method becomes very much effective. If simple random sampling method is applied in such situation then there is always a chance of exclusion some important elements in the sample. Here judgement or purposive sampling becomes very effective. For example, if the effectiveness of the workers of an organisation is to be judged then a sample is prepared by randomly selecting 10 employees out of 100 employees of the organisation. This sample may not have representatives from all the departments, the total sample may consists of one / two departments. Therefore the sample result can not give a general idea about the effectivness of all the employees of the organisation. In other way this may be said that the sample study fails to give correct idea about the objective of the research. There is no scope to judge the reliability of the result obtained from the sample, this is another demerit of this method.

Even though when a research is conducted to determine some unknown characteristics and features of a population then the entire population is divided into few categories then the elements are selected by examining each and every category. This makes the sample more reliable and representating.

ii) Convenience sampling :

When importance is given on the convenience of the researcher then it is known as convenience sampling. This kind of sampling does not consider the 'probability factor' as well and does not depends upon the rationality of the individulas. Instead of this sample is prepared in such a way so that it can provide the maximum advantage to the research. When a sampling is done from a telephone directory, registration list of automobiles then it is called convenience sampling. If the simple random sampling method is applied to prepare the sample even though it can not be considered as random sampling. The elements of the sample can not represent the entire population. Therefore this sort of sampling remain biased and never accepted satisfactorily. Even though if some exceptional cases where the complete data is not available of the total population the elements can not be clearly identified and where just the pilot study are conducted in such cases thus method is applied.

iii) Quota Sampling : Quota sampling is a special version of stratified sampling. In this method the population is divided into different class based on some known characteristics of the population. After this the ratio of all the elements of each class and

the elements of the total population is determined. Now the responsibility of the researchers are laid out, that is the study is to be carried out on what part of which classes etc. This way the proportionate data is collected from a total population. The advantage of this method is it helps to collect information from each strata which includes various elements of the population. Thus the collected data represents the population and reduces the expense of research. The main drawback of this method is during stratification the biasness of the sampler becomes predominant. Apart from this, since the sampling is not randomly done therefore the errors in result can not be statistically measured.

F) Precautions in using Sampling Methods

Few points are considered as precautionary measures while selecting sampling methods.

a) The sample must represent the entire population.

b) If the sample is enable to express all the characteristics of the population then it is as cannot completely represent the population and the goal of the research remains unreached if the research is carried out with this sample:

c) Therefore the researcher has to be very much cautions to ensure that the samples are not prepared with biasness.

Following are the precautions which are followed to do the above :

1. The survey, study and data collection has to be done in definite intervals where the characteristic change occurs quite often in a population.
2. It is to be ensured that the size of the sample should not be small. Because a small sample fails to properly represent the population. Therefore the size of the sample should be such so that it can express all the characteristic of the population. Sampling should not be done with intension, because then it increases the chance of biasness.
3. If the stratification method is applied for sampling even then principle of perfect stratification should not be followed.
4. If sampling is done from an incomplete table then also it becomes biased.
5. If freedom is given to the data accumulator for preparing sample without any guide-line then they prepare the sample as per their convenience. In such cases situation the probabillity of unbiasness and representativeness reduces.
6. Improper selection method makes the sample biased. Special precaution is required incase of preparing sample from a complex, heterogeneous and huge population.
7. The researcher should always be careful to ensure that the sample is unbias and can correctly represents. the population.

(G) Sampling Reliability :

Two aspects are important for selection of sample for a research work. (i) If should be unbias and random (ii) It should be reliable. The reliability of a sample depends on its shape, size, relevancy and befitting with the research. The sample should able to express correctly the characteristics of the population. Following are the joints based on which the reliability of a sample is judged.

i) **Size of the sample :** Size of the sample is very important to correctly express the characteristics of the population. The bigger the size of sample, the more it is expressive. The realibility is less when the sample is small in size. The researcher have to examine and judge whether the sample is competent enough for scientific research.

ii) **By testing the representative character of a sample :** The realibility of a sample can be judged by testing the representating feature of the sample.

iii) **Parallel Sampling :** To test the reliability of a sample another sample is prepared from the same population. After testing the reliability of the parallel sample the primary sample is tested. A clear idea about the two samples are obtained by comparing their results.

iv) **Homogeneity of the sample :** A sample which is prepared out of a large population must express all the characteristics of the population. Therefore by testing the homogeneity the reliability of a sample is judged.

v) **Unbias selection :** The sampling should be done in such a way that there should be no biasness at the time of selecting the elements. The unbias selection method is more reliable.

vi) **Preparing sample from the main sample :** This is a process of preparing sample to sample. Many a time this is done just to test the reliability of the sample. The newly prepared sample is then well tested and the obtained result is compared with the results of the main sample. This enables to identify any error in the main sample.

(H) Sampling and Non-sampling errors :

In case of statistical analysis the error which occurs at the time of data collection, analysis and processing they may be categorised in two part, 1. non-sampling errors and 2. sampling errors. These are discussed below :

1. **Sampling errors :** Generally the survey is conducted on a small portion of a large population, by taking a sample of the same. Therefore it is quite natural that there is a possibility of differences with the result of actual population. Moreover if the survey is conducted on more than one sample prepared from a large population even then slight

deviation is seen in the results.

i) **Error in sample selection :** Intentional sample selection can not be unbias. Therefore it evolves error. It the elements of samples are intentionally selected then it becomes biased. In case of sample selection the probability of error is very high when it is urorginisedly selected.

ii) **Incomplete Investigation :** If investigation is not carried out on all the elements of a sample then the obtained information becomes biased. In such situation the questionnaire method is applied. It is often seen that in such situation all the questions are not answered.

iii) **Error in Data Collection :** It there is any error in the method of data collection then it is reflected in the entire process. The possible reason for error in data collection is as follows :

a) If the data collector is not careful enough at the time of data collection then the accumulated data becomes faculty for example if the data collector does not ask questions or record the answers correctly then the information becomes faulty.

b) If the answerer lacks in knowledge then the answers are not correct and proper.

c) If the questionnaire is weak.

d) If data is collected other than any approved method.

iv) **Replacement :** If an .element or a persons on whatsoever in not present in the sample and the data collector collects the data from a replacement, due to this the sample becomes biased and result remains incorrect.

iv) **Faulty analysis :** The inference of a research is drawn by analysing the collected data. But if the analysis is faulty then the sampling error occurs.

From the above discussion it is observed that the biased attitude of the data collector, answerer and information supplier creats lot of errors. But many a times it is also seen that with no fault of the data collector or answerer just due to accident some error occurs. This types of error are known as unbiased error, most of the time these errors are set off just by complementary each other, and does not influence the result of the research.

2. **Non sampling errors :** If the sampling is done correctly even though it can not be said that the surveyor the research is error free. In fact in all stages of a research such as data collection, data processing, data analysis, an error may occur. Therefore even if there is not error in sampling still the following errors may occur which are known as Non-Sampling errors;

i) The incorrect presentation and improper planning about the subject of research.
ii) If there is wrong selection of population on which the research will be carried out.
iii) If data collection is done with incomplete and faulty questionnaire.
iv) Wrong approach for data collection.
v) If the data collector collects in consistant and errounious data.
vi) Personal inclination or biased attitude of the presenter.
vii) In correct knowledge about the variables of the research.
viii) Misutilization of average value.
ix) Adapting wrong methodology for research.
x) If there is any fault in different measuring methods of the research.

There may be more reasons apart from the above for Non-Sampling errors. But if the above reason can be removed or eradicated then the research can be made error free.

Exercise :

1. Explain the importance of sampling.
2. What are the methodologies followed.
3. Explain the main methodologies for sampling.

1.7 Data Collection

Research is a scientific investigation on an unknown subject or problem. It is important to collect data to reach the goal of the research and this is considered as one of the prime of job a research, because inference can be drawn only through data analysis and data of processing. In case of research, two types of data are collected—1. Primary Data. 2. Secondary Data.

A. Types of Data Collection :

Primary Data : The recorded data done by a researcher is considered as primary data because they are collected directly from the people (mass) and the theoretical perspective of data collection method often varies.

C. R. Kothari mentioned about data collection in his book—Research Methodology—Methods and Techniques; he says "The primary data are those which are collected a fresh and for the first time, and thus happens to be original in character." Practically data is the raw material of a research work. As per requirement the collected data can be appended and organised. The advantages that are obtained from the primary data for a research is as follows :

i) Primary data is always correct and reliable, because that are always obtained from the natural source.

ii) Depending upon the requirement of the user many useful information can be obtained from these data.

iii) As these data are error free therefore more reliable.

iv) This kind of data clearly indicates about the limitations of collection procedure, information and other aspects, of the research.

v) To make the data transparent and easy to understand the data related words are clearly explained. There is a proverb that spine is nature with rose. Similarly there is no doubt about the usefulness of primary data but it has difficulties and limitations too. They are as follows :

i) **Expense :** It is petty expensive to collect the primary data.

ii) **Time :** Enough time is required this type of data. Therefore to collect the primary data enough time, labour and money is required.

iii) **Skilled worker :** It is not easy to collect the primary data. Skilled workers are required for this job. Otherwise the chances of error in the collected data becomes high.

Secondary Data : The data which are not unique, which are collected by the others and published in general are called secondary Data. This data are statistically processed. For example, the information published by the Reserve Bank of India or any information published in the government journal are called secondary data. Primary data are collected directly from the people whereas the seconday data are obtained from the documents. These are written documents which contains the research related information. They are of two types—Documents that are based on primary data and documents that are based on secondary data. The first kind of document is called 'Record' and the second kind of document in called 'Report'. According to John Madge 'Record' tells about the day to day happenings and on the otherhand Report describes about the happening of the past, and therefore it is secondary. Two types of documents are extensively used as data source of a research work. These documents can be classified into two-Personal document and Universal of Government document.

(B) Merits & Demerits : The secondary data also have merits and demerits as in the case of primary data. The merits are as follows :

i) **Expense :** Secondary data collection is not as expensive as primary data collection. Another facility is that, one can get ready information.

ii) **Time :** Secondary data does not require same amount of time for collection

which is required for primary data collection. These data are collected much faster.

iii) **Range of Data :** The range of secondary data is quite wide spread. This kind of data works as a base of collecting more data.

On the other hand the following are the disadvantages :

i) As these data were intially collected on a different perspective, therefore these data may not be always relevant to the particular research work.

ii) Due to the mobility and ever changing behaviour of the surroundings these data may become redundant and condemned. Therefore they can not be used.

iii) The correctness and reliability of secondary data depends upon the source from where it was collected.

iv) Some times it becomes quite time consuming affair to find the source of secondary data.

v) Many a times the range of data is so wide that it becomes very expensive and time consuming to collect relevant data.

c) Difference between Primary & Secondary Data :

Point of Difference	Primary Data	Secondary Data
1. Data Source	Data is collected directly from individuals	Data is collected from published documents.
2. Method of data collection	Generally questionnaire of study is used	Data is collected after studying the published documents.
3. Statistical Processing	Statistical processing is required	Statistical Processing is not required because generally they are processed data.
4. Uniqueness of Data.	Primary Data is unique the user collects these data.	They are not unique and might have used earlier.
5. Time	Data collection in time consuming	Data collection is not so time consuming
6. Expense	Data collection is expensive because it requires efficient and well trained worker	Data collection is relati-vely less expensive.
7. Correctness of Data	Primary data is more correct	Chances of error is very high in case of second ary data

Generally two types of data are used in a research work. Even though the differences between there are listed below.

D) Consideration for Primary Data Collection

Following points are to be considered at the time of primary data collection—

1. Economic Points which includes.

i) There should be a parity between the expense of data collection and usefulness of the data.

ii) Short term data collection is considered to be more useful than long term data collection.

2) Issues involved which includes—

i) The data collector has to ensure that he has the technical knowlege which is required for data collection.

ii) Requirement of data determines the size and nature of the research.

iii) It is rational to collect small amount of data separately for each subject where the subject of research is related to more than one problem.

iv) If the problem is multirelational type then there should be a correlation between them. In such situation the data collector have to work as a team.

3. **Human aspects :** It is advisable not to collect data unless the mental obstruction or reaction due to data collection is overcome.

4. **Other aspects :** Other aspects related to primary data collection are—

i) **Time Frame :** The data collection is to be completed within the stipulated time which has been alloted in the Research Plan.

ii) **Expense :** It should be seen that the expense for data collection should not exceed the approved amount.

iii) **Accuracy :** The justification and accuracy of the collected data is to be taken into consideration.

E. Methods of Primary Data Collection :

Application of different methods has been seen in case of primary data collection amongst them following four are maximum used. They are—

1) Observation Method.

2) Personal Interview.

3) Questionair Method.

4) Case Study Method.

These are discussed below :-

1. Observation Method :

This method is widely seen in data collection. This method is extensively used in case of researches like production system and behaviourial science. From the psychological point of view observation is organic feelings such as to see, to listen, to smell, to taste and to touch.. In case of a research work observation is unification of watching and listening. In fact the objective of observation is to study the cause-effect relationship of different incidents. The characteristics of observation is as follows :

i) **Direct Method :** In this method the data collector has to apply his watching and listening ability at the time of data collection hence it is direct method.

ii) **Observation and Noting :** The observer or data collector very carefully watches the incidents and notes down the results.

iii) **Selective and Intentional data Collection :** In this method the observation is driven with or specific objective. The observer collects such data which are relevant to the research work.

iv) **Cause-effect relationship :** The observation helps to find out cause-effect relationship in a resea:rch work.

Merits and Demerits of observation methods :

The merits of observation method are as follows :

i) Since it is easy and simple therefore it can be easily applied to any research work.

ii) It is more practical because different data is collected on the basis of real experience.

iii) The data collected through this method are more perfect and reliable.

iv) This method is highly effective for the hypothesis of research.

The demerits of observation method are as follows :

i) It is not effective in all sorts of data collection because in some cases it is not possible to have impartial or unbiased observation. For example, in case of some emotional subjects such as 'Liking-Disliking'. the personal outlook of the observer plays a predominal role.

ii) In some cases the result of observation is considered to be fictitious.

iii) As the observation process requires enough time, therefore this method is quite expensive and time consuming.

iv) Many a times the group on whom the observation will be carried out come to know

the objective of the observation and they act artificially. In such situation the obtained result hampers the objective of the observation.

v) Since the method is very slow therefore the observer and the observable both might get frustrated.

vi) The ultimate result depends upon the study and explanation of the observer. Therefore the method is person dependant. Therefore there is always a chance of having human error in the results and which is undesirable.

vii) Since the observer is aware of the objective of study therefore at the time of data recording the discretion of the observer gets importance which is not desirable.

viii) Some times this method ignores the ethical side of the research work.

• Types of observation Method

The observation method is divided into two parts depending upon the role of the observer. These are—

1. Participant observation

2. Non-Participant observation.

(1) Participant Observation : In this method the role of the observer is most important. In this method the Researcher gets involved in the day-to-day life of the relevant sector to collect data. This is also known as disguished observation. The Researcher has to stay and live for a long time with the particular sector, even if he does not like to stay with them still for the sake of research he has to do it. In this process if the researcher can acclamatise himself with the group then only he will be able to collect proper data about their behaviour and life style etc. The collected data then spreaded in Nine parts. These are, individual, work, substance, action, incidence, time, target and feelings. John Madge made his statement on Participant Observation like this, An observer will be considered as Participant observer only when the wavelengh of his soul will match with the soul of the members of the particular groups of people. The merits of this observations are as follows :

i) Since the role of the observer is unknown to the group, therefore they behave normally, and due to this the possibility of destortion of data becomes nil.

ii) Only through such observation emotional situations can be studied.

iii) Data collected through this method are very much reliable.

The demerits of this method are as follows :

i) As the observer maintains confidentiality about the aim of his observation thus this method is considered unethical.

ii) In this method the observer become part and parcel of the term and plays an important role in the team. It influences the team and the natural behaviour of the team gets interrupted. It reflects on the result and thus the collected data becomes impure.

iii) As the observer in involved with the activity of the team therefore he fails to observe certain aspects. As a result the collected data remains impure.

iv) Some times the observer gets so much involved with the team activity that when the team is in crisis he forgets his objective. This also hampers data collection because at that time he ignore his prime job of data collection and combats with the critical situation.

Although in case of participant observation the observer takes part in the society and explain his motive to them. Here the observer acts as a reporter.

2. Non participants or Direct observation :

This is just the opposite of Participant Observation method, here the does not take any part in the team activity, but only observers. The research related members most of the time does not know that a research is conducted on them, because in this type of observation the researcher remains unnoticed. For example the passenger in a railway station do not even known that their activity is being observed (watched). There the role of the researcher is like an observer and the nature of observation is like testing. In such case the researcher remains indifferent but his entity is well secured. The data pertaining to all the members of the society can not be completely obtained in this method. At the same time there is every possibility of misinterpretation of their behaviour.

There are two subsections of observation method i) Organised observation ii) Unorganised observation.

Organised observation is a reason and logic based observation method. When the researcher carries out the observation by following the hypothesis then it is called organised observation. In an organised observation all the aspect of observation are pre-planned such as whom to observer, when to observe, who can be observed etc. In such observation the observer apply his objective endeavour and tries to control the surrounding situation. This method is used to finalise to draft plan of the research.

On the other hand when data is required to be collected from the natural perspective then this method is applied. Since one cannot have any control over the natural phenomenon therefore no preassumption can be made and the observation can not be carried out with preplanning. Therefore no endeavour is taken to control the natural phenomenon and observation is also done without planning. So this method is used to unvail any natural phenomenon.

In the conclusion this can be said that depending upon the field and nature of research the research methodology and role of the researcher is decided. There can not be any definite and clear instruction in this regard. The methodology are to be selected depending upon the justification. However it can not be denied.

Steps in organising observation :

The research workers those who wants to collect data through observation, are advised to follow the following steps.

1. To specify the nature and Rage of observation :

The researcher has to draw a future plan for data collection which is based on the hypothesis of the research. The type of observation, the aspects for aperservations, the topics that are to be included or excluded in the research these are categorically mentioned in the sketch plan. This makes the observation object oriented and reduces unnecessary wastage of time and labour.

2. Time, Place and Subject of Observation :

Observation for data collection may continue for long or short time. The observation may be conducted in a laboratory or in an open space. Apart from this it is to be predecided thtat whether the observation will be done in total or its will be partial.

3. Selection of observator :

The efficient observers are to be selected in relation to the nature and objective of data collection.

4. Arrangements of required tools :

In many observation modern tools and gadgets are required, like tape recorder, camera, bino-cular etc. Therefore these gadgets requires to be prearranged.

If the researcher considers all the above steps while collecting data then it becomes more effective and reliable.

2. Interview Method

This method is widely used for collecting data for a research work. Here the data collector came in direct contact with the data supplying individual and collects data in interview mode. Generally the data collector asks few research related question to the interview and takes note of the answers. This is one of the direct and unique technique of data collection. For example, if a researcher wants to carry out his research work on the school teachers than he have to go to a school, meet the teachers, and collect data by interviewing them. This method is so effective that data can be obtained from the illiterate people because data is collection only through conversation.

Interview method is applied in two ways : In observative research the researcher records the answers to a preselected well defined set of questions. On the other hand

in field research the interview is done based on conversation. That's why these interview are unorganised, uncontrolled and in-depth. The interviewee does not understand that they are giving interview. In such session emphasis is given on the outlook and experience of the members and accordingly questions are raised listening to the answers and understanding them goes on simultaneously. However, the merits of Interview method are given below :

i) A direct relation is established between the interviewer and the interviewee through this method. This makes the data collection more easy.

ii) As at the time of interview the discussion and question answer session takes place in a face to face situation therefore question and answer both can be place very clearly.

iii) Factual data is collected through interview method which is not possible through observation method. The emotional outlook, subpressed encouragement and other aspects of human life can be known only through interview method. Therefore sometimes interview is call super-observation.

iv) Apart from the above the justification of data which are collected from other source is also possible through this method.

The demerits of this method is as follows :

i) There are certain points which can not be expressed in an interview, but can be expressed confidentially in writing. Therefore if interview is conducted on such subject in data collection becomes difficult. It is seen that most of the time in such situation data remains incomplete.

ii) In general interview is an art. If the interviewer does not have proficiency then the interview becomes unsuccessful. Similarly if the interviewee has lack of intelligence then also it becomes difficult to obtain correct data.

iii) If the interviewer is guided by wrong ideas then the interview becomes confusing.

iv) At times some of the human characteristics gets more importance in the interview session, naturally the other aspects become less important. Because the researcher emphasises most on the professional and vocational aspects compared to the environmental aspects therefore the collected data tends to be faulty.

Types of Interview :

In case of data collection for a research work different types of interview methods are adopted. Every interview has different significance. Based on their significant characteristics the interview methodology can be divided as per the following :

1) Following are the types of disciplined interviews :

i) Formal Interview : In this method the interviewer or the researcher conducts the interview based on a well defined questionnaire and takes note of the answers, in a disciplined manner. This type of interview emphasises on the order and the sequence of the question. The interviewees are asked same questions so that the obtained answers can be compared. The merits of this interview methods are a) Collected data can be compared, b) Uniformily of the data can be checked and c) If the interviewer is slightly lack in skill even though data collection is not hampered.

ii) Informal Interview : In this method the interviewer can change, revise edit the questions depending upon the requirement of the interviewee, so that the interviewee can answer the questions in a relaxed mood. In this process the interviewer can change the order of the questions or may omit or includes some questions. The merits of this type of interviews are a) In such kind of interview session the interviewee are not under pressure and he answers to all the questions in a very relaxed manner. b) The answers what ever they may be are clear and simple. Therefore correct data can be obtained. On the other hand the demerits of this methods are a) The collected data or answers can not be compared, b) It is comparatively difficult and, time consuming to conduct such interview session, c) This kind of interview session requires indepth knowledge of the interviewer, and d) Since the data collection process is quite slow therefore this method is not useful to collect data from samples.

2) The interview session can again be divided into two, based on the number of interviewees.

i) Personal Interview : In a personal interview session one person can be interviewed at a time. This is a face-to-face session and the personal opinion of the interviewee on a particular topic can be obtained from this session.

ii) Group Interview : Two or more persons can be interviewed at a time in group interview session. This type of interview is conducted where the personal opinion of the interviewee is not essential.

3) Objective Oriented interview are of two types :

i) Diagnostic interview : When an interview is conducted to find out the cause of an incident then it is called diagnotic interview.

ii) Therapeutic interview : This sort of interview is not as specific as the diagnostic interview. In this interview the data is collected based on a pre-arranged questionnaire.

4) Methodology wise interview is again of two types.

i) Non-directional interview : This sort of interview are also known as independant interview. Here the interviewer does not put any control over the interview session. No pre-set questionnaire is also used in such session. The interviewee is only encouraged to

give answer and describe his experience.

ii) Focused interview : This method is maximum used in case of survey of the psychological and social influence of different mass media like Radio, Television, Cinema etc. The significance of this kind of interview is it help to understand the personal reaction, emotion and mind set of an individual.

5. The interview can be again divided into two base on the subject.

i) Qualitative interview : This type of interview are conducted where there is'a complexity in the subject, and it is not quantitative. Like - Case studies are done to assess the depth of a specific problem, this is called qualitative interview, because the objective of conducting such interview is to assess the past, present and future of the problem.

ii) Quantitative interview : When data is collected from large number of people on a particular incident then quantitative interview is conducted. In case of census this method is applied to collect data.

Means of getting correct response in an Interview : The researcher will follow only such interview method which will help him to collect correct data. The less in deviation of data the lesser is the complexity and expenditure of research. Normally the perfectness and correctness of data depends upon the technique and intelligence of the interview. There is no definite rule for this. Even though if the interviewer follows the following rules then the interview becomes fruitful.

i) The researcher have to develop a good rapot and relation with the interviewer before starting the interview.

ii) Enough time should be given to the interviewee so that he can fully express his views.

iii) The researcher have to be totally aware so that the objective of the interview does not get interrupted. During the interview session one can be a little witty to make the session fruitful and effective.

iv) The researcher should be watchful enough to see that the interviewees are listening the questions with proper attention and give the replies with enough thought. If the researcher and interviewee becomes in attentive then chances of distortion in always. these.

v) If the researcher gives due importance to the answers and encourages the interviewee then the outcome is good. The interviewee takes part in the interview session with more enthusiasm and gives more appropriate answers.

vi) If the researcher have any doubt on any answer then he may adopt interrogative approach to clear his doubts. Apart from these following are the protective measures which a researcher may follow.

a) Sometimes the interviewee becomes emotional while giving answer and exagarrates the fact. The researcher have to be careful in this situation and he have to omit the unnecessary portion of the answers.

b) There should not be any correlational gap between the interview. This means the answers should have a continuity so that they can be well understood.

c) It has been quite oftenly observed that the interviewee tends to divert the interviewer and sometimes tries to exite him by insulting. This type of interviewee needs to be handled tactfully and one must keep himself calm and cool to have total control over the situation.

(d) In some cases it is seen that the inexperienced interviewer gets annoyed by the behaviour of the interviewee and this reflects on his report. This is not at all desirable.

(e) Apart from the above the interviewer has to analyse the cause-effect of the interview.

3. Questionnaire Method : This method is also applied widely for data collection. The researcher has to find out a means to collect the variable data. Here the means is to prepare list of questions. The list consists of some conventional questions which is given to the data supplier. Generally a format is enclosed with the list of questionnaire which the data supplier has to fill and return to the researcher within a stipulated time. In the questionnaire specified areas are reserved for writing the answers and the necessary instruction for answering are also mentioned in the questionnaire. The interviewee himself fill up the answer without taking help from the researcher and sends the same to the researcher by past.

The questionaire may or may not be organised in case of organised or sequential questions the answers are also given. The examinee has to select the correct answer from multiple choice. Put in case of unorganised questionnaire no specific answers are supplied with the questions the examinee gives the answers depending upon his or her own loish and experience.

Types of Questions in Questionnaire :

The questionnaire which is prepared to collect relevant data for a research contains various types of question. Depending upon the nature of answers these quesionnaires are addressed differently. They are as follows :

i) Dichotomous questions : When a questionnaire have one two answers (one is positive and another is negative) to a question and the examinee has to select only one out of these two, then it is called dichotomous questions. For example whether the candidate know English?...Yes or No.

ii) Multiple choice questions : This type of questionnaire have three to five possible answers to a question. Every answers is considered as substitute of the other. The answerer has to select any oile of them. While preparing this kind of questionnaire the paper setter have to be careful enough to see that all possible answers are included in the list.

iii) Factual and opinion questions : Most of the questions in this questionnaire are factual and opinion oriented. The profession, income, standard of living etc. of an individual are considered as factual questions. On the otherside some questions are framed to know about the opinion of the individual on a specific topic. These type of questions are mostly used public opinion pole / survey. Like, whether capital punishment will be abolished or not? The problem for this types of question is you never get a complete and correct answer, because it depends upon the outlook of the interviewee and because of this a same question may have several answers from different individual. To solve this sort of problem, first the incident has to be described and then questions on opinion may be sought.

iv) Theatening questions : If the questionnaire contains any question on a sensitive issue then it creats a threat to the mind of answerer. These are called threatening questions. This includes illegal activity, antisocial activity, mental health (state) family income act. Generally the interviewee tends to avoid this question by giving superficial answers. As a result the chances of erroneous answers are quite high in most of the wit cases. But if the researcher can gain the confidence of the interviewee and assures him to maintain the confidentiality then chances of getting correct answer increases.

v) Contingency questions : This type of questions have two parts. The answerer has to give the answer of the second question in respect to the first one. In respect to the first question it is to be assessed that whether the second question is relevant to the answerer or not therefore the second question is called contingency question. For example, an individual may asked about him family life in this way- i) Are you married? ii) How many years ago you got married? Among these two questions if the answer of first one is 'yes' or positive then only the answer to the second question can be given.

vi) Matrix questions : If data is sought for more than one individual through a single question then it is called matrix question. When the unit of observation differs from final unit of analysis then this type of questions are included in the questionnaire, such as in case of cluster sampling if a family is considered to be the unit of observation but actual unit of observation is the members of the family. In this situation the head of the interviewed to collect data of all the family members and data pertaining to all the family members are recorded uniformly.

vii) Open-ended and closed-ended questions : Questionnaire consists of two types of questions open-ended and closed-ended. In case of open ended questions no answers

are supplied, like which Television programme you watch to see the most? What is your aim in life? These are the examples of open-ended questions. In a research work when the natural and spontaneous answers of an answerer requires to be recorded then open-ended questions are being used.

On the contrary the closed-ended questions have more than one answers from which the answers has to choose. This kind at questionnaires are mostly used in case of Huge survey or Quantitative research. This saves the time, labour and money for the research. This also helps to analyse the answers through statistical method. However framing of such questionnaire creates controversy. Such as how many answers will be allotted to a question? Shall there be any answer with neutral choice? what will be the order of selective answers etc. Practically any question can have two choices "Yes or No" calliration "agree or disagree" but it may also have more substitute answers. Like, if the question is raised to give some one's view on the topic.

'Liberisation is the carrier of Economic progress. The alternative answers to this question are 'correct', Partially correct' 'Don't know' 'Partially wrong', & 'Totally incorrect'. Generally questions with just two alternative answers are less found in a questionnaire because here the answerer does not have enough freedom to choose. Hence the researcher gets biased answers. But this kind of questionnaire is very much effective when the answerer is less qualified (literate). However questionnaire are prepared with more alternative answers to collect enough data on a topic, because the answerer gets opportunity to think and decide. But to much of alternative makes the entire thing confusing. On the other side any nutral impression within an answer also creates controversy. As there is no other alternative answer therefore the answerer is compelled to select one of such answer. Sometimes just to avoid the correct answer the answerer choices a natural answer-which is not atall desirable.

Merits and Demerits of Questionnaire Method :

Data Collection through questionnaire method is a conventional approach of a research work. But this method also have approach of a research work. But this method also have some merits and demerits which are discussed below :

Merits :

i) Data can be collected mush faster and with less expense through this methods, in compared to other method.

ii) This method does not require much expertise of the data collector.

iii) This method is most useful where the answerers are scattered and spread over a large place.

iv) As the same data is sought from all the answerers therefore this method saves time and money.

v) In some cases this method is rated to be very much effective though in many cases the reliability of this method is quite doubtful.

vi) The answerer's are supposed to be out of influence if data is collected through this method therefore reliability authenticity and meaningfulness of data is mostly assured.

vii) The uniqueness of the answers are maintained in this method because the answerers themselves gives the answer therefore chances of mistake is also less.

viii) Statistical method is applied to analysis the data in this method.

Demerits :

i) As the answerer is not very much interested to give answers therefore in many occassion its becames difficult to get complete data which has an adverse effect on the research.

ii) Sometime the imcomplete answer, unreadable and unclear answer disrupts the entire process of data collection.

iii) If the research requires longterm, indepth study then thus method is not very effective.

iv) Flexibility is very less in this method. Because the questions can not be changed or revised depending upon the situation. Hence difficulty arises in data collection.

v) If there is any fault in preparing the questionnaire then it disrupts the entire research process.

vi) There is no change to face the answers in this method, therefore chances of giving distorted answer in very high.

Considerations in Questionnaire Design :

At the time of preparing the questionnaire maximum importance is given to the relevancy and appropriateness. Becasue the result of the research fully depends on the data which has been collected through the questionnaire. Therefore if there is any error in the questionnaire then the mission of research gets interrupted and researcher misdirected. That is why questionnaire has to be prepared with gets proper care and attention. The following points are to be considered at the time of preparing the questionnaire.

1. ITEMS : One question should include only one topic. If a question contains more than one topic then the answerer might give answer to anyone of the topics. As a result the other topic gets excluded. Apart from these all the answers should separate in topic wise so that the answers do not get messed up with each other. This can be explained

through an example. Suppose a close-ended question and its answer is like this :

You fall ill in what interval?

i) Once in a year or less

ii) One to four times in a month

iii) Once in a week

iv) More than once in a week.

Here, if the answerer becomes ill once in a week then his answer may be either of (ii) or (iii).

Since the alternative answers are not distinguished between each other so it becomes difficult for the answerer to find the right answer. It should be carefully attched that there should not be any sensitive issues included in the questionnaire. Because answers to these question are not very oftenly reserved and if at al answer is obtained the authenticity and reliability of the answers are not much. For example, Do you accept bribe?

This kind of questions are not only rejected but it spoils the mental set up of the answerer therefore the answerer becomes non cooperative.

2. Order of questions : The questionnaire is prepare with numerous questions. The order of the questions requires to be set properly. The order of the question reflects the number of attempts and rejection of the answerer. In this regard Newman suggested that the questionnaire should be divided into three parts–Initial part, Intermediate, and Final part. The initial part of. the questionnaire will comprise only of those question which the answerer will find easy, comfortable and encouraging to answer. In this stage there should not be any sensitive questions. But it should contain a set of questions which has an inter' relational tendency with the next stage of questions. The intermediate part should be set in a logical order. Apart from these the set of questions for a same topic requires to be clustered and corrected. The sensitive questions are included in the final part of the questionnaire, because it does not make any interruption at this stage.

3. Selection of word and length of questions :

Usage of words, in a question influences the response to a high extent. All the words should be clear, precise and easy to understand and appropriate in a question. The technique to follow a question in a questionnaire is to find out the questions which has been expressed with minimum number of words. Usage of more than one word is not advisable where a single word is capable to express the appropriate meaning of a question. Lengthy questions waste more time of the examinee and so he loses the interest of answering. It creates difficulty to understand the question. This type of problem arises

more in case of correspondal (postal) education. To determine the quality of words in a question is another major point for consideration. The same word can not be used in a question for literate, half literate and illiterate persons. So while preparing the questionnaire the researcher has to consider the literacy grade of his target group. Limited colloquial words may be used in a question, which means that in special cases some coloquial words may be used in question but not entirely possible. Finally it is to be seen that in case of selection of words, they should be clear, meaningful and without double tone.

4. Overall format of questionnaire : After selecting the items of a questionnaire, the words it and the order of the questions then comes the planning of overall format of the questionnaire. David Dooley said that the questionnaire should be clear properly arranged and easy to understand. It should be free flowing from one question to the other. Every question should have serial number and anecdotes. It is better to have several units of questions rather than having too much questions on a particular topic. The benefit of this is that it enables the answerer to give answers to those portion with which he is concerned. He does not unnecessary try to give answers to all questions. Apart from these the questionnaire requires to have space to put the name of the answerer, date of answering, identification code etc. Generally the left or the right corner of the questionnaire is reserved for this. The top sheet of the questionnaire. contains the name of the research organisation, the name of the research fellow and objective of the questionnaire. Apart from these, it is ensured that there is enough space to write the answers in a open-ended questionnaire. In fact the shape and size of the questionnaire encourage the answer to response. Although there is no fixed rule for this even then it is always better to have a small size questionnaire. The questionnaire ends up with a thanks to the answerer.

5) Pretesting of questionnaire : The last phase of questionnaire preparation is pretesting, initially a draft questionnaire is prepared then it is circulated to a limited number of answerer the determine the flows and faults and accordingly the questionnaire is revised. These answerness may not be the same in final stage. The pretesting may be conducted with friends. Classmates and colleagues, but these pretesting can not be carried out every where which means pretesting has got certain limitations. For example unmarried persons can not be asked any questions related to family planning. At the stage of pretesting the questionnaire is revised based on the comments of the answeres. Suppose the answerer thinks any of the questions in the questionnaire as irrelevant of meaning less then it is better to omit that particular question from the list. Besides this the finalisation of questionnaire depends upon the kind of answers given by the answerers suppose the answerer responses with 'don't know', 'not applicable', 'no comments' or 'not in a position of answer' etc. then it is to be seen where lies the problem or flaw in the question and accordingly it is to be changed. This way through pretesting the questionnaire is changed

and revised to make it ready to use in the main research programme. According to Moser and Kalton pretesting is an ideal process to judge the competency of a questionnaire.

4. Case Study Method :

Though unit observation, interview these are the accepted methods for collecting data for a research work. This method is extensively used in psychological study, disease detection. Although in case of quantitative research this method is not very useful but in qualitative, especially in biographical research this method is considered to be very useful.

Case study is such a method through which a particular situation can be discussed and re-discussed to obtain the elements, causes etc. about an incident. According to the order the cases may be small to large, this means the cases may be individual, Family, groups, institution, district, population etc. Data are collected in the context of natural history through this method. The data collected through this method gives a complete documentation of the case.

• **Types of Case Study :** Some important types of case studies are as follows :

i) Intrinsic case study : In this type of study the researcher wants to know the significance of a case without knowing it theoretical part. When the study is carried out to understand the inner side of a child, patient, culprit, or an organisation then it is called intrinsic case study.

ii) Instrumental case study : In this type of study the characteristics of the case is deeply studied so that it can give direction to further research or can make refinement of a theory.

iii) Collective case studies : This type of study is carried out on more than one cases. The idea or inference drawn from the previous case is either supported or opposed through this method. Collective case study helps to frame the theory for a problem or incident.

iv) Disciplined-comparative case study :

The usage of this type of study is mostly seen in case of framing a theory. Data collected though this type of study can prove or discard any established truth. Such as one of the ideas or theory in relation to crime is—unsocial company gives birth to a tendency of crime. This idea or theory can be verified through case study. If the data obtained from the case study yields the relevancy of the theory then it is established otherwise it is changed and revised.

• **Design of case study :** The case study is counted as a separate method is case of data collection for a research work. Therefore some special points are mentioned in its design, which are discussed below :

i) Setting of questions : Like other methods here also research oriented questions are set. There questions are, who, what, why, when, how likewise.

ii) Relational propositions : The subject of research is related to a specific direction. For example, it can be proposed that the efficiency of the governing body and cooperation of the teachers helps to improve the atmosphere of a school.

iii) Deciding units of research : The units of research are determined in the context of the subject and problem of the research and in respect to the questionnaire. If the subjective question is role of assistant teachers then the unit of data will be assistant teachers. On the otherside if the role of teaching methodology is the questionnaire then the unit of research will be teaching methodology.

iv) Data collection process : Data collection is the next important step of research. The process of data collection is to be mentioned in the research design.

v) Linking Data with Preposition : This is the final stage of a case study base research. The qualitative loding is done after analysing the collected data, and through this some special patterns are indicated in this stage.

• **Advantages and disadvantages of case study :** Some special advantages are availed in a research work by applying the case study method. But the method is not fully avoid of disadvantage. The advantages & disadvantages of the method are discussed below.

Advantages :

i) Methodology wise flexibility : The researcher is not confined by the rules and regulation of the method. The researcher may apply any method depending upon the requirement of study. The researcher may follow any method as per need like observation, interview, analysis of personal and collective data.

ii) Study in natural atmosphere : The unit for research is studied in natural atmosphere, Thus spontaneous and up to the mark data can be obtained through this is method.

iii) In-depth study : It is presumed that an in depth study of a particular unit can make the researcher able to collect detail data about the subject. This helps him to frame the main question and obtain answers to the allied questions.

iv) Framing of hypothesis : Case study plays an effective role to present the message of the research which may be carried out later. It helps to prepare the questionnaire of the next research and takes the role of investigative research work.

v) Testing of Theory : The data obtained from a case study helps of change or refine any conventional theory.

Disadvantages.

i) Expensive : Data collection through this method is very expensive time consuming and laborious. Besides these it takes enough time to analyse the data.

ii) Biasness : As the researcher does not has to follow any specific instruction/rules and regulation so personal influence and biasness works at the time of data collection and analysis. Therefore the method is not impartial.

iii) False confidence : The most disadvantage of this method is the false confidence and misconception of the researcher about his own decision.

iv) Disadvantage of Generalisation : Data obtained from case study can not be generalised because all the case studies are unique.

v) Reliability and purity : Maintaining the reliability is very difficult in case study, because if another researcher conducts study on similar case even then the data may not be similar.

1.8 Data Processing & Analysis

It is not enough to collect data. Collected data has to be analysed to understand it inner sense. Therefore the data requires to be well arranged and precised. If the collected data remains unorganised then it becomes impossible to analyse them. Data organisation and data analysis depends upon two aspects–Nature of data and objective of research. Thus the data processing and analysis is different is qualitative and quantitative research.

• **Data Processing :** Data processing means to make the collected data analysable because at the initial stage the data remains in unorganised form hence becomes difficult to analyse. Thus the unorganised, scattered data are first organised and summarised for analysis. This is done through a process called classification. The classification processe is done by qualitative cooling. Qualitative coding is actually qualitative classification. Some important steps to do this job is as follows :

1. To clarify what is expected from the data : The collected data are to be put into a matrix for research purpose but this can not be hafazardly done. The orientation should be objective and analysis friendly.

2. Specific classification of data : If the questionnaire prepared for data collection is properly studied then a general conception of classification automatically comes out. Many times the idea of classification starts from the very beginning of the research work. Infact the comention of classification is to first select the direction and dimention of data.

3. Informative Classification : Primarily the specific dimension of data is identified then the data are classified. These are considered as abnormal/unusual units.

4. Codification of all data : All the data needs to be codified. Codified According to newman there are three types of : i) Open coding ii) Axial codification iii) Selective coding.

i) Open Coding : This coding is done at first stage of collected data. In this method the different source of data are observed to find out the actual cause of incidence and then they are codified.

ii) Axial coding : This is done in the second stage. This coding do not have direct relation with the data. Through this process the primary idea lift ups to an abstract idea, the primary code transforms into a composite code. This type of coding helps primary code to become more clear.

iii) Selective Coding : It is the last/ultimate stage of collected data. In this stage the previous coding in analysed and the flow of the research process is ascertained the data are elaborately observed.

• **Data Analysis :** Data Analysis is very much important in a research work. Because the result of a research is obtained from this analysis. This involved three stages.

1. Editing and summarising of data.

2. Consising the huge data to make it usable.

3. Analysing data through statistical method.

The above points are discussed below :

1. Editing : The first step of analysis is to edit the collected unorganised data. The objective of editing is to identify the flaws and error in the collected data and make necessary revision. Though it is a routine work but it has to be done with special care and caution the steps that are to be followed for editing are as follows :

i) To examine the correctness of data and eradication of any in completeness.

ii) To examine the correctness/authenticity of data and eradication of any ambiguity.

iii) To examine the uniformity of data because it is difficult to apply statistical method in data analysis if there is ununiformity in data.

Therefore the objective of editing can be defined as per the following :

i) Assurance of correctness.

ii) Relevancy with other data.

iii) To be sanguin that all data have been uniformly recorded.

iv) To be sanguin that data is not incomplete.

v) The accumulation of data is useful for coding and tabulation.

2. Briefing and making useable the data collected :

Briefing of data is done after the editing. Infact the huge volume of collected data is a fearsome thing to a researcher. It is not an easy task to include this huge volume in the report. Therefore these needs to be summarised, and briefed. This briefing is not always possible to do manually therefore now-a-days computers are used to do the same Codification is compulsory if the work is done by computer, because coding makes the data understandable by the computer. Besides these the unorganised, scattered data are be changed into computer language . Besides these the unorganised data are stored in a table to make them organised and concise. This makes the unorganised data organised and the data become useful. The statistical method can now be applied on the organised data to study the inner information. The work involves three steps, they are as follows.

i) **Coding :** Coding is the process which put a value to the collected data so that they can be included in a proper class. When data counting or processing is done through machine then the requirement of codification is very much felt. Actually preparations of code language for a data is known as coding. Four laws are to be followed for coding, they are–

i) It should be compeling for the problem and objective of research.

ii) It should be established on a disciplined classification

iii) It should be wide enough to accommodate data coding

iv) It should be wide enough to accommodate data coding

v) Two data cannot have same code.

Three types of process has been found for codification for a research work. They are pre-coding, post coding and terminal coding.

ii) **Data Entry :** The research work cannot be completed just by collecting data. The collected data is analysed and then decision is taken data requires to be classified and properly oriented so that they can be analysed.

In conventional data processing method data is first coded then stored in a code sheet. At present this is done through computer. Because it helps to do the data analysis with immense speed and accuracy. Now-a-days the data is kept in the form of file in a computer instead of being kept in a code sheet. The code sheet consist of 80 columns similar to computer punch cards. The codifier writes the proper code in the right column of the code sheet put at present this is done without the code sheet. The data collected through Telephone is entered into a computer through CAT1 Process. Now-a-days the

filing can be done with immense speed.

iii) **Tabulation :** Data counting means to count the number of data included in a class. However, before commencement of data counting the data analysis plan is to be finalised. This can also be done mechanically. Generally data counting is mechanically done when the data volume is very high, and where data is stored in cross tabulation manner.

iv) **Data Analysis :** It is the main important task of a research work. What ever steps has been discussed earlier are the allied tasks of a research work which may be addressed or termed as plinth work of a research. The research of a research is obtained from data analysis. Statistical method is extensively used in data analysis. The various information is obtained from the data by using statistical method. For example Accumulated Mean (AM) (HM ?) Standard Deviation (SD), Variation Correlation, regression etc. The significance of result is also measured, the results obtained from this helps to take number of decisions and establish correlation with the topic and objective of the research work. Therefore data processsing reaches to a totality through some interrelated phase. They are–

a) Classification of unorganised data.

b) Codification and tabulation of class.

c) Comparison between the classes needs to be done by finding out the ratio-proportion, percentage rate of a set of organised data by applying statistical method.

d) Use of graphical presentation of data to make them understandable by the general people.

e) By asserting the tendency and orientation of data, and by summarising and finding out the coefficient of correlation of data the interrelation between the variables are established.

f) As the aim of a research work is to generalisation of idea therefore different statistical method like chi-square-test, t-test, z-test etc. are applied to simplfy the process.

Exercise :

1. Explain the different modes of data collection.
2. What are the demerits of data collection through interview method ?
3. How data processing is done ?

1.9 Writing of Thesis or Report

The final stage of a research work is to prepare the thesis report of the research. Unless the thesis is presented the research work remains in complete. The theses is mainly divided into three parts. These are Initial part, Mid-Part and Final-Part.

The initial part of the Thesis consists of Research Title, Acknowledgement, and preface. Besides these the list of topics, table, graphs etc. can also be included in this part.

The begining of the main part of thesis contains objective of the research, the methodologies which have been followed in the research and discussion points of the research. At the end of the substance of research the research result, inference drawn from the research etc. are duly mentioned in the thesis, the unanswered questions and unresolved problem in the research work is also mentioned in the thesis so that these could be attended in the future. The final part contain the appendix, colophone (Reference book list) index etc. Though there are different types of research work but the basic structure of the thesis paper is same. The main seven parts of a thesis is discussed below :

i) **Stating the research problem :** In the first part of the thesis paper the research problem should be clearly stated. This help to understand the direction of the research work. The research design, data collection, data analysis these are listed in the research problem statement.

ii) **Survey of literature :** Research related problem is not an isolated incident. It is framed and assertained after doing some exercise such as observation of some past research work. Certain concept and survey. Therefore at the time of mentioning the research related problem the past result of some research work is also to be mentioned as the perspective of the present research work. This clarifies about how much research has been done in the past on the current problem on which the research is carried out, and what was the progress. This indicated how for the research problem is known and how for it is unknown. This needs to study lot of published materials like books, articles, thesis paper, journals, literatures, which are available with the related problem. This portion contains information about the recent development and results on the similar kind of problem. This helps to have a direction of the research work.

iii) **Making of hypothesis :** The problem for research is described in details, in this stage. In a hypothesis the problem is defined in one or number of questions and some hypothetical answers to these questions are also proposed in the hypothesis. These experimental answers are identified as hypothesis of the research. Different concepts, variables and authenticity of the research which are included in the hypothesis is also

mentioned in this part.

iv) **Methods of research :** This part contains the description of the population which will act as research unit in future. The next phase consists about the sampling method, such as how the sampling will be done, how the sampling and non sampling errors will be removed these are mentioned in the thesis paper. This chapter tell about how the research work has been conducted.

v) **Presentation of Findings :** This presentation of findings of the research work is mentioned in, this chapter so that the reader can understand the theme of research. Generally the relevent information and eliminate the unnecessary data. Therefore the tendency, distribution, graph, statistical table etc. of a research work is to be mentioned in the thesis paper to make it concise, informative and presentable.

vi) **Analytical discussion :** This chapter deals with analytical discussion and the summary of discussion. The subject of research, the proposed hypothesis these are explained precisely in the thesis. If the hypothesis does not have relation with the collected data then thus is also mentioned in this chapter. The failure of the hypothesis raises question on the justification of the research project. In some cases the inference of a research is tried to be established in light of other research work like which information or method can be useful for future research etc. Most of the time it is seen that presentation and analytical discussion goes on side by side.

vii) **Conclusion :** This is the final part of the thesis paper. The summary of all chapters are written here.

Neuman says "Its purpose is to summarize the report and it is sometimes titled "Summary." After conclusion the reference and addendum, corrigendum are also included. This also contains the list of reference books, list of questions, statistical table and data etc. are also included.

Exercise :

1. Explain the main structure of a research thesis.

Reference books :

1. Social Research-Process & Methods by– Prof. Krishna Das Chattopadhyay
2. Research Methods by –Ram Ahuja
3. Sociology by –C. N. Shankar Rao

Section B ❐ Statistics

Unit 2 : Preliminary Introduction to Statistics

2.1 Definition, Importance, Scope Limitation Statistics and its application, Objective and usage Different Class of Statistical data, Source and Collection method

2.2 Data analysis

Statistics

2.1 Introduction

A. **Definition :-** In the Nineteenth Century the word 'Statistics' was used to describe collection of organised data. It was not only meant for numerical data but the word 'Statistics' was used for collection of data about a Nation or its population. In the mid of Eighteenth Century the Famous German Scholar Gott fried Achenwall first used the term 'Statistics'. The world 'Statistics' has evolved from the word 'State'. The term 'Statistics' was primary used to depict collection of data about the State Administration.

At present 'Statistics' is a widely used term. To-day 'Statistics' means collection of statistical data, their measurement, classification, tabulation, analysis etc. Therefore it can be defined as–

Statistics is the subject which scientifically deals with collection of data by observation and deriving various theories by comparing and analysis of those data. Thus collection of data, measurement, tabulation, analysis and interpretation of these are all parts of 'Statistics'.

The term 'Statistics' is used both in plural as well as in singular sense. In plural sense the term 'Statistics' means statistical data which are collected from personal experience and observation about a particular subject. For example the production statistics of different year of an organisation, statistics of price index, statistics of educational institutions, etc. Therefore the plural sense of statistics is a service of numerics obtained from measurement and counting. In singular sense statistics is a scientific activity which deals with numerical data collection, their presentation, analysis and significance, methodology etc.

Unlike physics, chemistry, life science, geology, statistics is not a separate stream of science.

It is more like Mathematics, a collective tool of scientific methods. In subjects like Science, commerce, Arts etc. Whereever measurement and counting is possible, statistical analysis method is applied there. However, in general 'Statistics' means starting from numerical data collection to their analysis through various methods.

(B) **Importance :** The importance of statistics is felt from various corner. Its area of application is varied. Statistics can express the significance of complex data through different methodologies like diagram, different averages. Statistical method is indispensible incase of geographical comparison of chronological data. Different statistical method are very much useful to prepare hypothesis, testing and in research of investigation.

To justify the laws of physics and sociology statistical method and its techniques are very much useful. The important discipline and statistical process have a special importance in state administration. The application of Statistics and its importance has been manifold in the modern age of computer.

(C) **Scope :** The scope of 'Statistics' as a subject is very wide and varied. Almost in every strem of science statistics is applied. The extensive application of 'Statistics' is seen in Commerce, Economics, Sociology, Life Science etc. In fact whenever the use of numerial element is high, the application of statistical methods and techniques are very much seen in those are as. Collection of data, classification, tabulation, treatment of data, analysis of data, Interpretation of significance, all these statistical activity and their related techniques and methods are included in the subject. The subject Statistics also includes many topics of Mathematics. The concepts of Statistical method are widely based on Mathematics.

D) **Limitations :** Through the area of statistical application are numerous but it has got some limitation too.

1. Statistics can only be applied in numerical analysis Statistical methods can not be applied on subject or issues which can not be numerically expressed.
2. Statistics is the science of mass—not for individual. Therefore statistics can be applied on analysis of collective issues.
3. In the context of collected data if the statistical method is not properly followed then inference can not be drawn, it is often seen that the political leaders are misleading the business sector and general public by worng application of statistical method.
4. The Statistical data should always be uniform.

E. Objects and Utility of Statistics and Statistical Methods :

The main objective of statistics is to represent and express the numerical data in such a form so that it becomes easier to understand. Most of the time the unorganised and inconsistent data remains non-understandable, hence they becomes useless. Application of Statistical Method makes the numerical data organised and easily comparable to similar type of data set.

The government sector highly depends upon statistics on different areas. For example, Designing various plans, the satistical data requires to be collected in agricultural and industrial production. To solve the unemployment problem it needs to know the total number of unemployed in the country.

Extensive application of statistics is also very much seen in the private sectors. The Businessman, Industrialists, Politicians, every one has to depend on Statistics and its application in every steps of their life.

The job of a Statistician can be divided into few steps.

1. Collection of data.
2. Treatment of data—Classification, Tabulation, Graphs on charts and pictures.
3. Analysis of the data.
4. Interpretation.

F. Types and source of data : The data can be divided into two stages based on their types and sources (i) Primary data (ii) Secondary data

Primary data : The data which is collected directly from the area of investigation for a specific reason are called primary data. Thus characteristically primary data are unique. Such as a doctor can prepare a weight chart of his patients directly with the help of a weighing machine. These types of data set are primary data set. At the time of population census data is directly colllected. These are primary data set. Primary data set are more reliable, but to collect primary data it requires more money, time and labour.

Secondary data : The data which has been previously collected by some agency and later for some specific investigation if the ivestigator uses the same set of data then they are called secondary data. Secondary data is not unique in character.

When a data is availed from a census report by an investigator then the collected data are transformed into secondary data to the investigator. It is less expensive to collect secondary data because comparatively it requires less money, time and energy. The secondary data is aparently less reliable because while transcription or rounding from the source it may carry some error. Therefore total presentation it to be take for using secondary data. It is revealed from the above discussion that a data which is primary to

an individual, the same data may be secondary to another indifidual. For example, the data in the census report published by the Registrar General of India is primary data and the same data published in another book or report is secondary data.

Most of the time the source of data are divided into two : Primary Source and Secondary Source. The authority which directly collects the data from investigation area are called primary source. Likewise the agency that uses the data collected from primary source to somewhere else they are called secondary source.

In case of statistical investigation the primary data is most friutful, although because of limited time and money the secondary data are used. Therefore special precaution is to be taken to avoid the errors of using secondary data.

Some of the publications may be referred as primary data source.

1. The Censues Report published by the Registrar General of India.
2. The Reserve Bank of India Bulletin published from Mumbai by the Reserve Bank of India.
3. Annual Report of the Chief Inspector of Mine in India, published by the office of the Chief Inspector of Mines in India, Dhanbad.
4. The Indian Textile Bulletin published from Mumbai by the Textile commissioner.
5. Monthly Coal Bulletin published from Dhanbad by the Chief Inspector of Mines in India.

Some of the publications may be referred as secondary data source.

1. Statistical Abstract of the Indian Union published by the Central Statistical Organisation (C.S.O) New Delhi.
2. Monthly Abstract of Statistics, published by C.S.O.
3. Different Magazines, Journals, Books etc. published by the National and Foreign Governments, Municipality United Nations Organistion (U.N.O.)
4. Reports and Journals published by different Chamber of Commerce, Stock exchange etc.
5. Survey Report published by the Statistical Institute.
6. Daily News papers, Books, Business Magazines.
7. Various Statistical Reports.
8. Reports of different Committee and Commission.

G) Methods of Collection of data : Data collection is the primary job before going into a Statistical work. In relation to this there are some common terms

which are widely used like questionnaires, Schedule, about which are should have adequate. It is essential to have adequate knowledge about some common terms which are widely used like questionnaires, Schedule, about which are should have adequate. It is essential to have adequate knowledge about some common terms which are widely used in relation to statistics such as questionnaire, Schedule. etc.

A. Questionnarie : Questionnaire means a set of well defined questions about the investigation. The questionnaire should be prepared in such a way that it should be capable of collecting all relevant data. Generally in the first phase of observation a draft questionnaire is prepared and though this experiment answers are collected from a group of people.

The draft questionnaire is prepared to identify the flaws and defects in the questions so that they do not appear in the actual questionnaire. The flaws and errors in the draft questionnaire are then removed and revised. A good questionnaire should have the folowing features;

1. The question of a questionnaire should be written in simple language and it must be relevant with the topic / subject of investigation.
2. Number of questions must be limited, else the answerer will loose interest to response to every questions.
3. The questions should not be doubtful and difficult to understand.
4. Most of the questions should have multiple choice for answering.
5. It is better to avoid such questions which may hurt the ego or emotion of the answerer.

B. Schedule : In this context Schedule mean a list of topics / subjects on which data will be collected. Preparation of questionnaire, publishing of relevant information— these are not mentioned in the schedule. These activities are entrusted upon the investigator.

Different methods of data collection can be discussed, generally the following methods are followed during numeric data collection :

1. Interview method.
2. Mail questionnaire method.
3. Direct personal observation method.
4. Indirect oral investigation method.

1. **Interview method :** Data is collected directly from the spot of investigation through this method with the help of trained and experienced investigator. The investigators

are addressed as Enumerator of Field stuff. Each and every Field stuff reaches to a specific locality and collects data from the local people through personal interaction and interview with a set of specific questions. The local people who acts as data supplier are to be intimated about the investigation topic, and the answers obtained from the interview are carefully recorded. This is a very popular method of data collection by appointing field stuff and it is considered to be very effective.

2. Questionnaire through Postal Correspondence :

The questionnaire is the most important tool this method. The questionnaire is prepared with a bunch of questions about the subject of investigation. The required data are collected from the answers of these questions. The questionnaire is sent to a group of selected data supplier by post requesting them to duly fill up the questions with their answers and return the same by post. The correspondence includes the objective of investigation and instructions to fill up the answers. The confidentially of the total method is also assured. This method is quite faster and comparatively cheaper. This methods are : (1) The reliability of collected data through this method is relatively low. (2) Lot of questionnaire returns without any answer.

3. Direct personal observation method :

In this method the investigation personally stays in the place of investigation and collects data directly through personal, observation, counting and measurement. The investigator does not depends upon any other person for data collection and the collected data through this method are reliable upto a large extent. Although the purity of the data depends upon the honesty, whole heartedness and fine observation power of the investigator.

There are some facilities to collect data through this method.

1. Natural data can be collected through this method.
2. The flaws in the data that are collected by the data supplies can be avoided if data is collected through direct method.

There are certain demerits in this method :

1. This is an extremely expensive method.
2. If the investigator is not enough efficient and not very much keen about data collection then this method may fail to collect correct data.
3. If the field of investigation is wide sprade then this method is not very effective.

4. Indirect oral investigation Method :

Relevant data can be obtained from some indirect source. Persons with vast

experience about their surroundings and problems are identified and then they are interviewed to collect data. The investigation commission and Government / State Committee mostly follow this method in primary data collection. It is needless to mention that the sanctity of the data collected through this method entirely depends upon the unbiasness of the data supplier and honesty of the investigator.

Apart from the methods described in above data are also collected for the locally appointed agent. This method is followed where supply of data is required on a regular basis. The media sector specially follow this technique.

Exercise

1. Mention the two fields where term 'Statistics' are used.
2. Mention the significance and limitations of statistics.
3. Discuss about the different source and types of Numerical Data.
4. Discuss the various methods of data collection.

2.2 Analysis of Univariate Data

Univariate data means the set of data which has single variable. In the analysis of univariate data only a single variable is considered. The characteristics of data are expressed by some numerals. One of such character is a variate like age, height, weight, village, number of children etc.

If the value of a variable is stored haphazardly or in a disorganized manner then the significance analysis and comparative study of them is not possible. For example if the child mortality rate of Kolkata, Mumbai and Chennai for different year is haphazardly stored then it is not possible to derive which city has highest and lowest mortality rate. Therefore numerical data must be presented in a organised and summarised form.

Summarisation or Treatment of Data :

After collection of data the most important job is to organise them. There are various ways to organise the data. Following are some techniques which are followed to organise data.

1. Classification
2. Tabulation
3. Representation in terms of Graph or Charts and diagram.

B. Classification of Data : This is the main part of Statistical method. In general, classification means to orient a set of data in such manner which helps to ascertain their significance and similarity between the data within a class. For example, the style of sorting and arranging the letters localitywise before delivery which is done in a postoffice can be mentioned to understand method of classification of data. Organising of data in this manner for the purpose of investigation is called classification of data. The classified data should have interrelation and similarity–such as the letters arranged in a particular group of post boxes in a post office has a similarity and interrelation that in. The receivers of all the letters belong to same locality.

(C) Different types of classification : Generally Classification are of four types :

a) **Qualitative :** In this type the data are classified on the basis of their qualitative comparison and difference. Example—the population of a city can be classified on the basis of profession educational qualification.

b) **Quantitative :** In this type, based on the characteristic significance the data are classified in some numerical classes. Example—the population of a city can be classified on the basis of age, body weight, and income.

c) **Chronological or Temporal :** When the data are classified on the basis of time period then it is called chronological. For example, the child mortality rate in every year may mentioned to understand this. The data classified on the basis of time period are called time series, which means the value of a variable in different time is the time series.

d) **Geographical or Spatial :** When the data are distributed on the bais of Geographical position then it is called Geographical or Spatial Classification. For example— The different States of India can be geographically classified on the basis of their quantum of production.

It will not be out of place to mention that Chronological and Geographical classification are virtually another form of qualitative classification. Although these two classifications are mentioned separately.

Another type of classification of numerical data may be mentioned which is unique in expression—this is called Textual Presentation. Some times the numerical data are textually expressed. At the time of preparing an office report the plans and programmes are represented with numerial data. While presenting this kind of report the presenter has to be very much careful to keep the presentation precise and clear at the same time he should maintain the transparency and logical justification of data in his presentation.

Example : Suppose in a people survey on a Government activity / decision the number of male participant is 3000 and the number of female participant are 2700 out of which 1560 number of male participant give their view against the activity and in total 2140 number of participant give their view in favour of the activity and 450

number of female participant remains neutral. This is a typical example of Textual Presentation.

D) Tabulation of Data : the most effective and useful way of expressing data is in the form of Table. The Table is a combination of some Rows and Column, data are put into these rows and column. This method is called Tubulation. Tabulation makes the data precise and easy to analise. It is more well defined and organised in compared to Textual presentation.

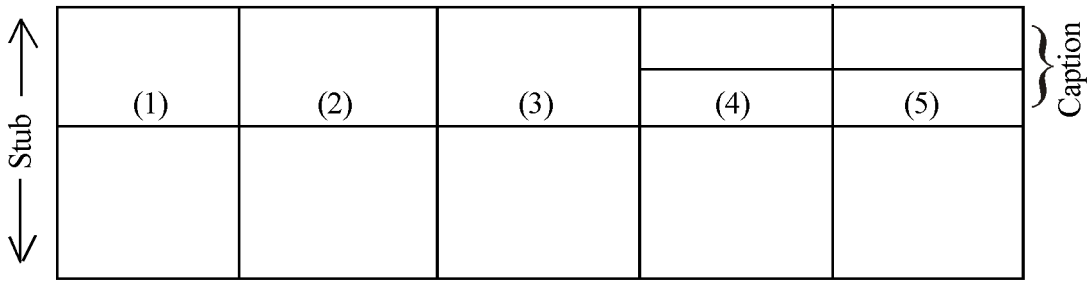
Table : A Table is a composition of well defined data which are put into Rows and Column.

A Table Contains following parts,

1. **Table number :** Each table is given a number for future reference and identification.
2. **Title :** A title is given to a table which precisely describes the subject of the Table.
3. **Stub :** The row names are called stub.
4. **Caption :** The Column name are called caption.
5. **Body :** This is the main portion where the data are kept.
6. **Foot note :** Foot note is given at the end of the table if any explanation is required about a particular data.
7. **Source :** The data source in a table are to be mentioned.

Table No.....

Heading.....



Source.....

Foot note.....

It is an art to prepare a superb table. Table may be of many types. But the basic objective of all sorts of table is to present the numerical data in such a form that it becomes easy to understand.

One should be very much careful as to see that the table does not become complex. If required then a complex table may be divided into number of simple table to represt the data.

Although there is no rigid rule of preparing a table but still a table should have the following properties.

1. A table should be consistent in length and breadth.
2. The data in a table should be entered and placed logically.
3. The title of a table should be clear and meaningful.
4. The unit of a table should be determined with reason.
5. The sum total of the rowwise and columwise data should be mentioned.
6. If the number of row and column is large then they should be identified by numbers.
7. Too many abbreviations should not be used in a Table.
8. If required then Foot note may be used in a Table.

Following is an example of a Table with Imaginary data.

Talbe No-1
Indias Fifth year Planning Expected growth rate of Gross Internal Production

Planning Period	Yearly growth target (Percentage)
(1) First Term Planning (1951-'56)	2.1
(2) 2nd Term Planning (1956-'61)	4.5
(3) 3rd Term Planning (1961-'66)	5.6
(4) 4th Term Planning (1969-'74)	5.7
(5) 5th Term Planning (1974-'79)	4.4
(6) 6th Term Planning (1980-'85)	5.2
(7) 7th Term Planning (1985-'90)	5.0
(8) 8th Term Planning (1992-'97)	5.6
(9) 9th Term Planning (1997-'02)	6.5
(10) 10th Term Planning (2002-'07)	8.0

Source : Plan Documents Govt. of India

(E) Diagramatic representation of data :

The attractive and effective form of represnting data are Graphs Diagram, Chart, Map etc. The Characteristics of data can be easily understood from its pictorial presentation. Selection of a perfect diagram mainly depends upon the nature of the collected data. There are same merits and demerits of this method which are discussed below,

Merits :

1. The Diagram is very much easy to understand.
2. This is the most useful method to send statistical information to general public within a very short time.

3. The significance of the data can be viewed at a glance.
4. This form of expression is useful for long term effect.
5. This method helps to compare similarities between to class of data series.

Demerits :

1. Diagram cannot represent the data in totality. This can only the general characteristics of collected data express
2. The approximate value of the data can be expressed through this method but the actual value required ignored.
3. It takes enough time to draw a diagram.
4. Only a limited information can be presented through diagram.

(F) **Frequency Distribution :** Certain special characteristic of data can be expressed through numbers.. Each character of data is a variable such as age, height, body weight etc. The value of the variable are organised by class or table. If the different values of variable are scattered then it is not possible to analyse their significance. Therefore data need to be serialised, and summerised by some process so that they can be analysed by applying various statistical methods. Serialisation or distribution of different values of a variable is called Frequency distribution. The same value of a variable can repeat. For example if an excersise is made in a college to collect data on the body weight of the students then it may be seen that there are number of students who's body weight is same. The number of repetation of numerical value of a variable is called Frequency of that particular class. The table for frequency distribution is called frequency table. If the number of data is large then the Frequency distribution becomes fruitful. Summarisation of huge volume of data is possible through tabulation.

The following table is an imaginary example of Frequency Distribution. The table has been prepared on the basis of number of room in 1000 building in a city. Since the number of room can only be a whole number therefore the value of the variable are not continuous. These kind of variables are called Discrete variate.

Table No.2

Frequency distribution of 1000 no. of Houses on the basis number of Rooms

Variate of numbers of rooms	Frequency of number of Houses
1	 75
2	 120
3	 175
4	 200
5	 275
6	 50
7	 35
8	 30
9	 25
10	 15
Total	1000

(G) **Discrete variable / variate and Continuous variable / variate :**

Discrete variable : The variable that can stone / accept value from a range is called Discrete variable such as the number of students in different colleges, size of family in a locality, proportionate number of male members out of 100 people.

Continuous variable : The variable that can store / accept any value from a range is called continuous variable. The height, body weight, personal income of individual are example of continious variable.

(H) **Attribute and variate / variable :** Attribute is a characteristic of data which can not be expresed in number Individuals prossesing an attribute can be distributed in many class. For example the another tongue of a sect of people, colour of flower, the sex of the children form in a hospital of a city are the example of imposed attribute.

On the other hand variable is a characteristics of data which can be expressed through numerics. These are called quantitative character. These type of character's can be measured and counted. The body weight of the students of a school, their age, these are the example of variable.

(I) Frequency distribution of an attribute : An imaginary data can be collected as the number of children born in a particular month in a hospital and they are segregated according to their sex. Suppose there are the new born female baby is 18 and the number of male baby is 22. A statistical concept pertaining to an attribute can be explained on the basis of their imaginary data. The sex of the child is an imposed attribute. Here the digit 18 expresses the number of female baby. Similarly the digit 22 expresses the number of male baby. The sum total of 18 and 22 is the total frequency.

Following is the frequency distribution Table

Table No. 3
Frequency distribution of children on the basis of sex, form in a city Hospital

Sex	No. of Children Born
Female	18
Male	22
Total	40

The total 40 number has been defined according to their distribution frequency in the above table. Some times Relative Frequency is used instead of total frequency in a Table. In such situation the Relative frequency of female baby is $\frac{18}{40}=0.45$ and in case of male baby it is $\frac{22}{40}=0.55$.

J. Frequency distribution of a variable : A variable can store different value and the numerical values of a variable. A continuous variable or a Discrete variable may have 'n' (countless) number of values. If a Frequency Table is to be prepared with all the values of a variable then the range of the variable has to be divided into some subrange and the data set is classified according to the subrange. In such situation the subrange is called class. The sum of a class is called class frequency. Suppose data is collected from different family of a city on the basis of the number of family members, suppose the range of member is 2 to 7 the value of the discrete variable will be 2, 3, 4.....7. These are considered as six class. If the number of family is 9 which has 2 family members in each then the 1st level series will be 9, Similarly all the class and their related numbers can be divided into many series. Following is an example of frequency distribution table.

Table No-4
Number of family members in different families

3	4	3	5	4	3	2	4	2	2
5	5	3	4	3	2	6	4	2	3
4	6	7	6	6	5	4	4	3	6
2	3	3	5	4	5	3	2	5	7
6	4	4	5	7	3	6	3	4	5
3	6	4	5	6	7	4	4	3	3
5	4	3	4	3	6	2	2	3	4
5	5	4	5	4	4	5	4	5	4
4	4	4	3	4	5	4	4	3	4

Table No-5
Frequency distribution of volume of family

No. of family members	Tallymark	Frequency
2	𝍸 |||||	9
3	𝍸 𝍸 𝍸 𝍸	20
4	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	30
5	𝍸 𝍸 𝍸 ||	17
6	𝍸 𝍸	10
7	|||||	4
Total		90

The numerical figures in table no. 4 has been tally marked and recorded. Then the tallymark has been counted to find the frequency of each class Like wise table no 5 has been draw with 6 class and their related frequency distribution.

Frequency distribution in case of a continuous.

Variable : A continuous variable can store any number of value Characteristically unique class can not be ascertained for all the unique value of the variable. To explicit this concept example may be set with high as a variable. Here it is the height of human being. Let us assume that in centiments unit the height are 165.5 cm., 166.4 cm., 165.2 cm etc. In this data the perfection of value is upto the first place of decimal such as

165.5 cm. In reality the actual value may be any number between 16.45 and 165.55. Some special technique may be followed to classify this kind of data set. Some useful ideas may be discussed in content of Frequency distribution.

1. **Class limits :** The value of two end of a class is called class limits. The extreme left points value is called lower class limit and the extreme right points value is called upper class limit. But these are not considered as class boundaries.

2. **Class Frequency :** The numerals or number of values of a variable of a class is called class frequency. In the previous example the class frequency is 9 of 2 member families.

3. **Class Internal :** The entire range of values of a variable is divided into subrange or sub class no the length of a subrange or the difference values of two end of a class are called class internal.

4. **Class boundaries :** If the upper class limit of a continious variable does not equal with the lower class limit of its next class. Then it may not be possible to accommodate the entire data as per their frequency distribution. It is not desirable to have any gap in between the upper class limit and lower class limit of a class. For this reason the compound average of upper and lower class limit of a class is calculated to determine the class boundary. It is needless to mention that the class boundaries evolves a new classification where the upper limit of the first one is equals to the lower limit of the second.

Example.

Class with class limit	Class with class boundaries
20-24	19.5-24.5
25.29	24.5-29.5
30-34	29.5-34.5

It is interesting to note that all the upper limits of a class boundary are equal to the lower limits of the next class.

The regular difference between the upper and lower limits of a class is called class interval.

5. **Class mark :** The middle value of differences in a class is called class mark. In the previous example the class marks are 22, 27 and 32.

6. **Class width :** The difference value of upper limit boundary and lower limit boundary of a class is called class width.

7. **Frequency density :** The Frequency density of a class is the frequency width of each unit.

$$\therefore \text{ Frequency density} = \frac{\text{Class Frequency}}{\text{Class width}}$$

The frequency density is used to compare the frequency concentration of different class, specially when the classes are of unequal width.

Now the problems and laws of Frequency distribution of continuous variable can be discussed here.

Suppose the value of a continuous variable is n. Now if a frequency distribution is to be framed with the value n the entire process can be proceeded as per the following.

At first the highest and lowest value of the given values are to be identified. The difference between these had numbers is the range. The range is then to be divided into some appropriate class on the basis of total frequency. To determine the number of classes, importance to be given to certain aspects.

a) The classes should be exhaustive so that they can accommodate all the values and data.

b) The classes should be mutually exclusive so that the same value does not appear in number of classes.

c) The number of classes should not be very high or very low.

d) There is not no hand and fast rule as to how many number of classes to be. Effectively for more than a 1000 frequency the class number is desirable to keep in between 15 and 20. If the total frequency is close to 1000 then the desired number of clases are 10 to 15. If the frequency range is much lesser that 1000 then the number of classes may be lowered down. However if the frequency range is around 200 then it is enough to keep the number of class between 7 to 8.

e) It is advisable to keep the same width of different class. But in some cases such as to explain the importance of income distribution the class width can not be kept fixed. Therefore the condition of equal width is not always strictly followed.

Keeping all these into consideration the range is defined with the class boundaries and divided into appropriate sections. Most of the time to facilitate the process a greater range is taken rather than the actual range.

Here after the given values are recorded in the corresponding class with tallymark. This process continues till all the values are considered. The tally mark is restricted within fire for easy counting easily.

For example, suppose in a test examination 50 number of students of a college has scored the following numbers in mathematics–

37	42	48	46	64	63	53	63	55	57
55	72	33	66	56	48	77	34	58	65
59	47	35	44	40	75	56	45	65	55
56	48	53	52	42	34	65	58	54	43
57	46	58	62	43	53	54	47	48	60

The Frequency distribution of numerical value is given below :-

Table No.- 6

Tallymark for data set in relation to obtained marks

Class Limit	Tally Marks
31 – 40	𝍸 |
41 – 50	𝍸 𝍸 𝍸
51 – 60	𝍸 𝍸 𝍸 𝍸
61 – 70	𝍸 ||
71 – 80	|||

Table No.- 7

Frequency distribution of obtained marks of 50 students in a College

Class boundaries	Frequency
30.5 – 40.5	6
40.5 – 50.5	14
50.5 – 60.6	20
60.5 – 70.5	7
70.5 – 80.5	3
Total	**50**

J. Cumulative Frequency Distribution : The Frequency distribution may be done on the basis of relative frequency : The class frequency can be gradually joined in ascending or descending order to find out the cumulative frequency distribution. Cumulative frequency destribution are be more than type or less than type.

The lesser cumulative frequency of a class means the lower class limit of the concerned class as compared with the upper class number as shown in table no. 7 is equal (i.e, 6) as their cumulative frequency and general frequency in the asscending order is same. The second grade cumulative frequency of lesser type is 6+14 = 20. Which means that the

number of student is 20 who have scored lesser the upper class limit 50.5. This is just the opposite in case of higher cumulative frequency of a class, where as per the above logic the number will be 3 + 7 = 10. Because the lower class boundary of that class i.e., 60.5 or above which has been second by 10 number of students.

This way the lesser type cumulative frequency is virtually related with the higher class boundaries and vice-versa. Let assume that in a frequency distribution table the ascending order of the class frequency is f_1, f_2, f_3.....Naturally the lesser type cumulative frequency will be $f_1, f_1 + f_2 + f_1 + f_2 + f_3$ ..... The cumulative frequency is to be determined on the basis of class limits, otherwise the data has been rearranged in class boundary order. The frequency distribution where these cumulative frequencies are shown called cumulative frequency distribution. The following cumulative frequency distribution table has been derived from the frequency distribution table which was shown earlier in table no. 7.

Table No. 8

Cumulative Frequency distribution of obtained marks of 50 students of a college

Class boundaries	Frequency	Cummulative Frequency	
		Lesser type	Greater type
30.5 — 40.5	6	6	50
40.5 — 50.5	14	20	44
50.5 — 60.5	20	40	30
60.5 — 70.5	7	47	10
70.5 — 80.5	3	50	3
Total	50	—	—

In the conclusion the significance of frequency distribution may be mentioned as a) simple frequency distribution and b) classified or cumulative frequency distribution. In a simple frequency distribution the value of a variable and side by side it frequency are individualy shown through a table (Example table No. 5). On the other side the cumulative frequency distribution is expressed with different values of variable and inter difference of various classes. (Example Table No. 7) The excellent and most popular expression of summarisation of series of numeric data is Frequency distribution.

K. Charts of Diagram : The effective method of expressing frequency of statistical data is through charts and Diagram. Infact the characteristics of statistical data can be realised just at a glance through charts and diagram. In addition to this the charts and

diagrams can explain the complexity of a problem—and some hidden facts. Diagram is very useful to ascertain the tendency of a time series. Sometime graphs are also used to find the errors. Diagram or graphs does not represent the entire statistical information. These can only indicate the up coming situation it takes enough time to draw a chart diagram.

Following are the general types of diagram and charts.

1) Line Diagram or Graph.

2) Bar diagram.

3) Pie diagram.

4) Histogram Frequency, Polygon, Ogire etc.

L) Line diagram of Graph : The most general method of expressing statistical data is through Line diagram or Graph. The relation between two variable is reflected by straight line or curve in a sine diagram. In a graph paper two lines are drawn vertically and horizontally. The vertical line is called y axis and horizontal line is called x axis. The joint of inter section of y and x axis is called origin. Suppose x and y are such two variables which may be discrete or continuous but if x das a reasonable value then y also should have its corresponding value. Here x is an independent variate and y is a dependent variate. The value of the variables x axis and y axis can be shown with predetermined units. The size or the unit of x and y may be different. The horizontal and vertical axis are also represented by x and y.

If the value of x variable is x_1, x_2, x_3 ... and if the corresponding value of y variable is y_1, y_2, y_3, ...and likewise the million values are marked as P_1, P_2, P_3 and if these joints are corrected with a straight line then it appears to be a line diagram.

In case of classified frequency distribution the class frequency are donated by class marks. If a graph required multiple line diagram, then they should be drawn separately. The measuring units should be clearly specified in a graph, the values of horizontal axis are mentioned in the below and the values of vertical axis are mentioned in the left hand side of the graph. The frequencies are virtually shown in the vertical axis.

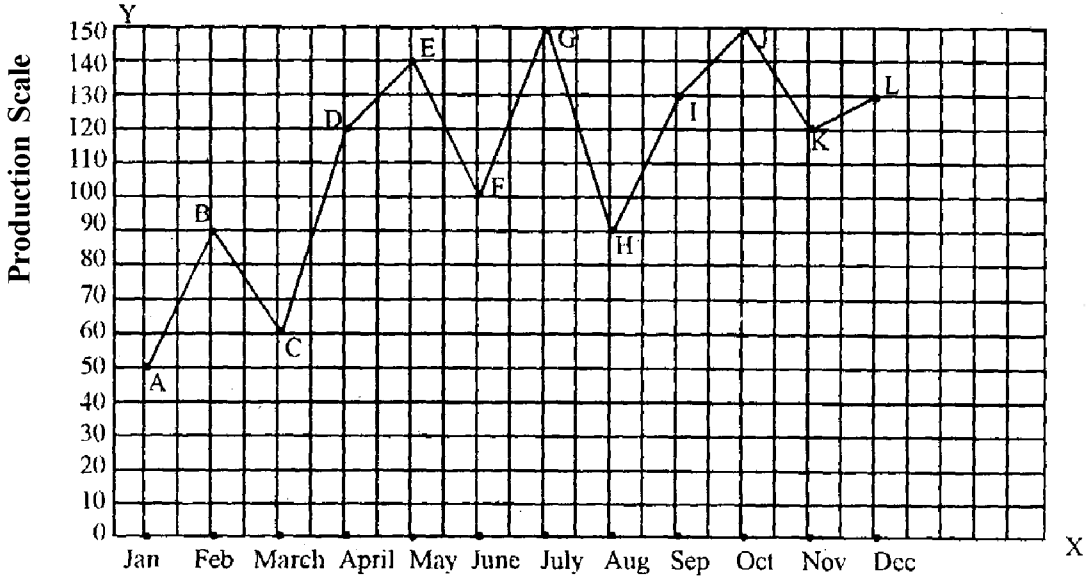
The coordinates of any point of a graph can be represented by (a, b) The abscissa? is a and ordinate? is b. In another way it can be said that the distance of a point from x and y axis is directly proportional to the value of a and b.

The horizontal scale may not start from the point of origin, but the vertical axis should be shown from 0 point. The graphs should have a little.

Example : The monthly production quantity of an electric fan manufacturing company is shown below :

January - 50, February - 90, March-60, April - 120, May-140, June-100, July-150, Aug-90, September-130, October-150, November-120, December-130. The graphical representation of the above mentioned numercal data is shown below.

Production Graph of Electric Fun Produce by A Firm



Month

Pic—1

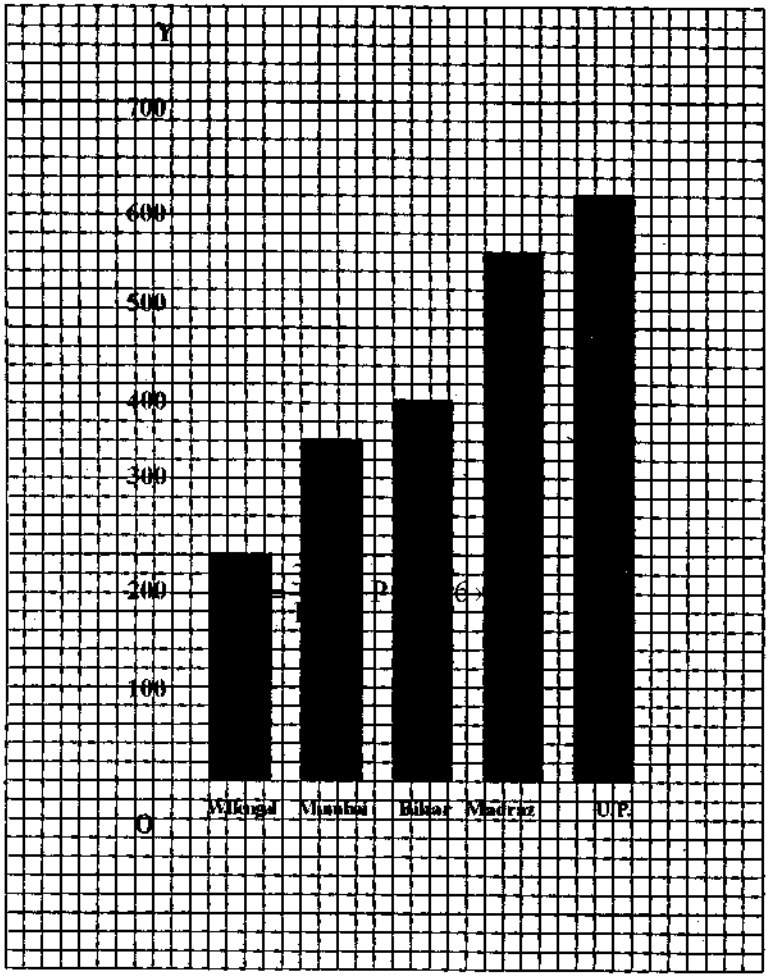
In the line diagram the months are shown in the x axis and the production quantity has been shown in the y axis as per the following scale.

Scale : The horizontal axis OX have small squares the length of 2 arms of these squares = 1 month and one arm of each small square OY axis is equals to 10 numbers of Fan. On this basis the monthly production quantity has been represented in the above line diagram. The productions of different months are divided by A B C D in the vertical axis and the distance between these points are proportionally shown in the horizontal axis.

M) Bar diagram or Bar Graphs : The frequency distribution of a Discrete variable can be excellently represented by a Bar diagram or bar graphs. Number of perpendicular lines with their values are drawn through x & y axis which look like created Bars. The length of a bar which represent the data set Or vale of a variable in always proportionate with its frequency. These bars can be shown both vertically or horizontally. Generally the time series are represented by variacal bars.

Example. The Chart of 5 states of India (As per the Census of 1951) is given below :

State	**West Bengal**	**Mumbai**	**Bihar**	**Madras**	**U.P.**
Population (in Lakhs)	250	360	400	570	630



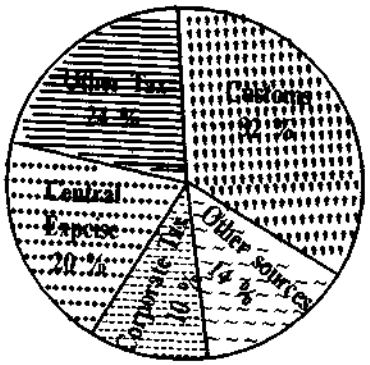
The Bar diagram may be different types such as vertical bar diagram, horizontal bar diagram, compound or complex bar diagram and partial bar diagram.

N. **Pic Chart or Circular Chart :** The complete data and its parts can be shown through pie chart. At first a circle is drawn then with the are. The sum of data are represented. Now the part of data is put in the parts of the circle in such manner so that they are of the part of the circle is proportional with the values of the corresponding parts. It is understood that a portion of the entire data will be a certain percentage of the entire data therefore the corresponding portion of circle will be same that of the percentage of the whole circle.

The diameter of a circle is first divided into 100 equal parts to make convenient for drawing a pie chart. The angle of centre of the circle is 3606. Therefore if the percentage of a portion of an entire data is P then the corresponding central angle of the partial circle will be $q=\frac{360}{100}\times P=(3.6\times P)$ degree. This way the entire pie diagram is drawn by calculating each slice of the entire circle.

Example : Following in the data of revenue collection in a year by the Govt. of India which is represented through a pie diagram.

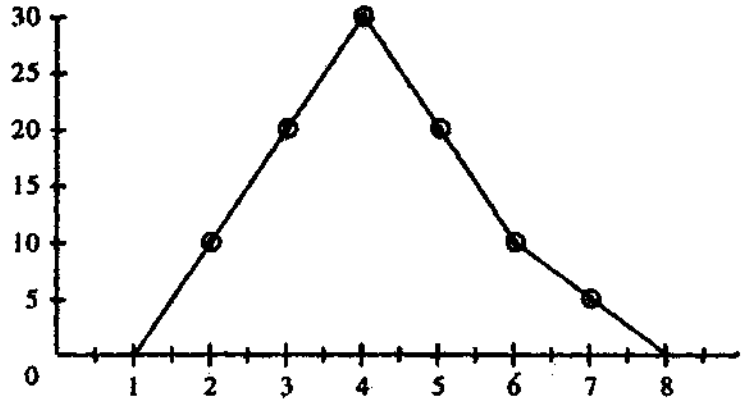
Source	Revenue (Rs. Lakhs)	Total Percentage
Customs	10880	32
Central Excise	6800	20
Other taxes	8160	24
Corporate Tax	3400	10
Other source	4760	14



Pic no. 3 : Pai Chart

The centre of a circle is 160°. Therefore 360° is equal proportion of 100% frequency. Then the centre will generate an angle of 3.6° for 1% frequency. So the angle which will be generated in the pie diagram for their corresponding frequencies will be (32 × 3.6 =) 115.2°, (20 × 03.6 =) 72°, (24 × 3.6 =) 86.4°, (10 × 3.6 =) 36° and (14 × 3.6) = 14°.

O. Frequency Polygon : A Frequency Polygon is an expression of discrete frequency distribution with a proper diagram. Here the value of the variable are shown is horizontal axis and the frequencies are shown is vertical axis. The data are defined by points in a polygon and the abscissa and ordinate of each point are the value of a variable and its corresponding frequency. Hence the frequency polygon starts from horizontal axis and finaly ends in the horizontal axis. The touch points are then connected with parts of straight line and gradually form a polygon, this is a frequency polyon. As per the earlier mentioned frequency table no. 5 a frequency polygon is drawn below.



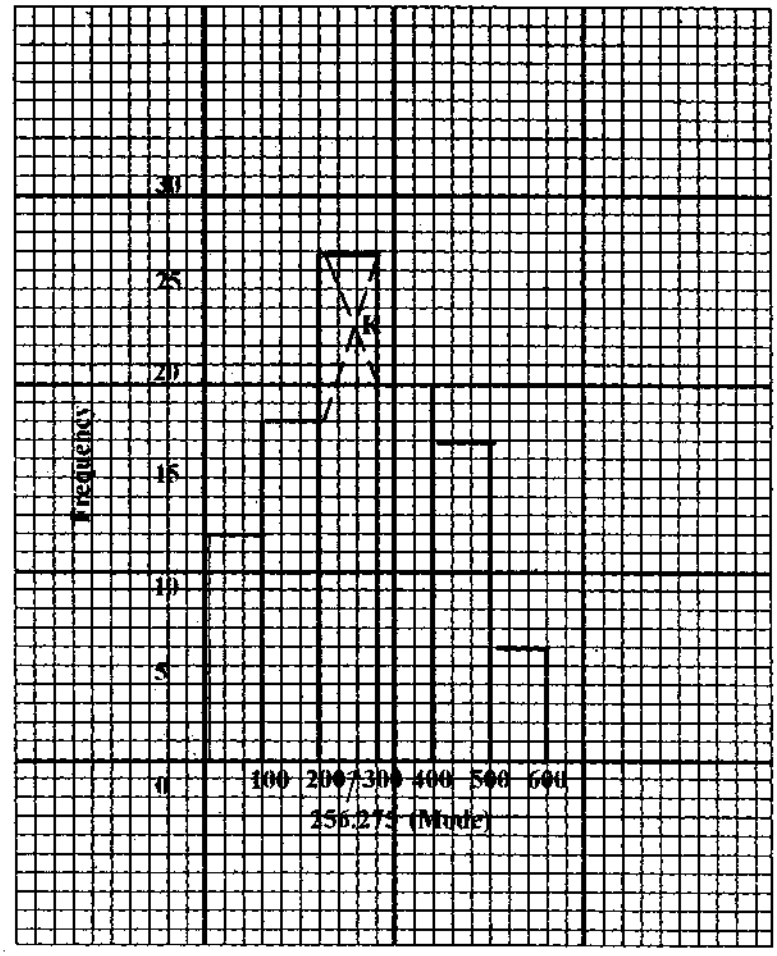
Pic-4 Polygon of Frequency distribution of family as per Table-5

(P) Histogram : It is the perfect diagram to express the frequency distribution of a continuous variable. In case of Histogram it is assumed that the frequency of a class is equally spread between the length of the class frequency. Here also the two axis are considered and class boundaries are shown is horizontal axis to indicate the class length. Then the rectangles for each class length are created in such a manner that the ক্ষেত্রফল— — every, rectangle are proportional to the corresponding class frequency. If all the classes are of same length them the height of the sphere rectangle will be proportional to the class frequency and the height of the sphere will be equal with the number of class frequency. On the other side if the class length are unequal then the width of the sphere will be ununiform. In that case the height of the spheres will be proportional to the frequency density.

Example : The Frequency distribution of monthly profit (in Rupees) of 100 shops are given below :

Profit of each shop :	0-100	100-200	200-300	300-400	400-500	500-600
Number of shop :	12	18	27	20	17	6

The histogram with the above data will be as per the following.



Pic-5 : Profit (Money)

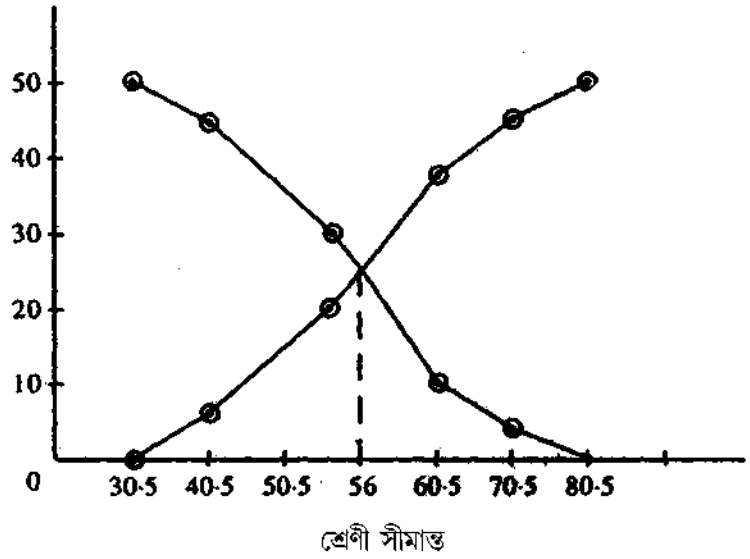
In the above diagram considering K as the point of insertion the mode can be calculated. On the horizontal axis if perpendicular lines are drawn from K then the mode will be 256.25.

(Q) Ogive : The unified frequency of a continuous variable and frequency distribution is represented by ogive the graphical expression of this type of frequency. While generating this kind of a graph the value of the variable are shown in horizontal axis and their corresponding cumulative frequencies are shown in vertical axis.

In case of cumulative frequencies less then type the upper class boundaries are represented by joints for a cumulative frequency which have plane of two axis. These points are the connected with lines to obtain a less then type ogive. On the other ride at the time of generating greater then type ogive the ogive is drawn of the basis of cumulative frequencies of the corresponding lower class boundaries.

Naturally the lower class boundary of the lowest class of lesser type cumulative frequency is zero and it is included whole drawing the ogive. It is just the opposite in case of upper class boundary.

Following is the representation of beth rype ogive as per table no. 8.



The median value can be calculated from the pictorial presentation of ogive. The median value is determined by finding the base point of the perpendicular line which is drawn on the horizontal axis from the insertion point of the lesser and upper ogive. As per the horizontal scale the value of the variable expressed by the base joints in the median. As per the above diagram the median is 56.

(R) Measures of Central Tendency : It may not be always possible to summarise huge volume of data through frequency distribution techniques. This may prose problem at the time of decision making. Special when decision are taken after lot of comparison. These the characteristics of frequency distribution needs to be respresented in more position value of the variables to make it very specific and precise where these can be expressed only by some special numbers. Such a number which stays some where in between the entire data set is called statistical average or just avarage. The statistical average are of mainly three types 1) Mean 2) Median and 3) Mode.

Mean can be again of three types

1. Arithmetic Mean of A.M.
2. Geometric Mean of G.H.
3. Harmonic Mean or Average.

(S) **Arithmetic Mean (AM) :** The sum of different values of a variable and the ratio of the number of values of a variable is called Arithmetic Mean. It x_1, x_2,....x_3 and like wise the values of the variable goes upto n then the Arithmetic Mean of x is n.

$\bar{x} = \frac{x_1 + x_2 + ... x_n}{n} = \frac{\sum_{i=1}^{n} x_1}{n} = \frac{1}{n}\sum_{i=1}^{n} x_1$ This is an example of simple Arithematic Mean.

It is clear from the above definition that the num of differential value of a variable from an Arithmatic mean is zero i.e., $\sum_{i=1}^{n} (x_1 = \bar{x}) = 0$.

proof : $\sum_{i=1}^{n} (x_i = \bar{x}) = \sum_{i=1}^{n} x_i - n\bar{x} = \sum_{i-1}^{n} x_i - \frac{1}{n}\sum_{i=1}^{n} x_1 = 0$

It can be said that $\sum_{i=1}^{n} (x_i = \bar{x})$ will become the lowest if the difference value of a variable is taken from any other frequency average.

Example-1 Suppose the salaries of 8 employees for the month of May in an organisation was 4500/-, 4650/-, 4700/-, 4800/-, 4600/-, 4530/-, 4850/- and 4774/-. The mean wage will be $\frac{4500+...4774}{8} = \frac{37404}{8} =$ Rs. 4675·50

In many cases if an appropriate element c is excluded from each value of a variable then it becomes easier to calculate the Arithmatic Mean. Let us assume that the element c is eleminated from the variable x and the serial values like y_1, y_2..y_n are obtained. Therefore $y_i = x_i - c$ for every i.

or $\sum_{i=1}^{n} = \sum_{i=1}^{n} (x - c)$ where n is the number of values of a variable

or $\sum_{i-1}^{n} y_i/n = \sum_{i=1}^{n} x_1/n - \frac{nc}{n}$

or $\bar{y} = \bar{x} = c$

or $\bar{x} = c + \bar{x}$

Example–2. Calculate the daily average profit of a grosser whose profit of 7 days were 210/-, 200/-, 250/-, 240/-, 230/-, 245/-.

Let us assume that the daily profit of shop owner is x and the values of x are $x_1 x_2 ... x_7$

Let $y_i = x_i - 200$ for each i. Therefore $y_1 y_2 ... y_7$ are actualy 10, 0, 50, 40, 30, 40.

Therefore the Avarage Profit $\bar{x} = 200 + \frac{10+0+50+40+30+45}{7} = 200 + 25 = 225/-$

If the values of a discrete variable are shown with their corresponding frequency then it is possible to calculate the Arithmatic Mean. Let us assume n number of values of the variable x are $x_1, x_2 ... x_n$ and their corresponding frequencies $f_1, f_2 ... f_n$ the Arithmatic Mean is calculated as per the following formula :

$$\bar{x} = \frac{f_1 x_1 + f_2 x_2 + ... + f_n x_n}{f_1 + f_2 + ... f_n} = \sum_{i=1}^{n} f_1 x_1 / \sum_{i=1}^{n} f_i = \frac{\sum_{i=1}^{n} f_i x_1}{N}$$

Where N = $\sum_{i=1}^{n} f_i$ this type of Arithmatic Mean are known as weighed A.M.

On the other side in case of discrete variable the difference of various class and their corresponding frequencies are represented through Data table. In such cases the Arithmetic Mean are calculated on the basis of differences in the class Means. Here $\bar{x} = \frac{\sum f_i x_1}{N}$ where $x_1, x_2 ... x_n$ is the class mean of class difference and $f_1, f_2 ... f_n$ are the corresponding class frequencies.

The change of origin or base takes place when the length of the class differences are same, and it becomes eusier to calculate the Arithmatic Mean by changing the scale. Each class mean is divided by after declating c where c is the anticipated origin and d is the scale i.e., general length if the corresponding latest values of x_i is y_i then

$$y_1 = \frac{x_i - c}{d}$$

or $x_i = c + d_i$

or $f_i x_i = f_i c + d f_i y_i$

or $\sum f_i x_i = c \sum f_i + d \sum f_i y_i$

or $\frac{1}{n} \sum f_i x_i = c + \frac{d}{n} \sum f_i y_i$, where $\sum f_i = n$

or $\bar{x} = c + d\,\bar{y}$

Example–3 : Calculate the Arithmatic Mean from the following frequency distribution.

Monthly income :	Less than 200	200-399	400-599	600-799	800-999	1000-1199
Number of Earner :	25	72	47	22	13	7

Table 3.1 Weighed A.M.

Class difference	Frequency (f)	Class Mean (x)	$y=\frac{x-499\cdot5}{200}$	fy
0–199	25	99·5	–2	–50
200–399	72	299·5	–1	–72
400–599	47	499·5	0	0
600–799	22	699·5	1	22
800–999	13	899·5	2	26
1000–1199	7	1099·5	3	21
Total	186	—	—	–53

If $y = (x - c)/d$ then $\bar{x}=c+d\bar{y}$

Therefore c = 499·5 and d = 200

$$\therefore \bar{x}=499\cdot5+200\left(\frac{-53}{186}\right)=499\cdot5-56\cdot99 \quad = \text{Rs. } 442\cdot51$$

(T) **Properties of Arithmatic Mean :** Some significant properties of Arithematic Mean is given below :

a) If all the values of a variable are same and equal then the general value will be the Arithematical Mean of the number of values.

b) If x is such an variable of x = a + by then the Arithematic Mean between x and y can be expressed as per the following

$$\bar{x}=a+b\bar{y}$$

c) The sum difference of every value of a variable is zero then that of the Arithmatic Mean of a variable.

d) If the variable x has two goups of values and if the A.M. on n_1 number of values of a group is $\bar{x}_1$ and the A.M. of n_2 number of values of other groups is $\bar{x}_2$ then the A.M. of sum of data can be expressed as per the following :

$$\bar{x}=\frac{n_1\bar{x}_1+n_2+\bar{x}_2}{n_1+n_2}$$

Example : It the average age of 20 girls whose 15 and 25 number of boys average age in 24 the calculate the total average age of boys and girls.

Let the number of girls = n_1 = 20, number of boys = n_2 = 24 Average age = $\bar{x}$ = 15 Average age of boys = $\bar{x}_2$ = 24

Let $\bar{x}$ is the cumulative average age of the girls.

Therefore $\bar{x} = \frac{x_1\bar{x}_1 + n_2 + \bar{x}_2}{n_1 + n_2} = \frac{20 \times 15 + 25 \times 24}{20 + 25} = \frac{900}{45} = 20$ years

(u) Geometric Mean G.M. : The nth root of product of the a class with n number of value is the geometric mean. It the variable is x and n number of values are x_1, x_2, ... x_n then the geometric mean will be

$$x_G = (x_1, x_2 \ldots x_n)^{\frac{1}{n}} = \left(\prod_{i=1}^{n} x_i\right)^{\frac{1}{n}}$$

For frequency distribution

$$x_G = \left(\prod_{i-1}^{n} x_i^{f_i}\right)^{\frac{1}{n}} \text{ when } n = \sum_{i=1}^{r} f_i$$

(v) **Characteristics of Geometric Mean :**

(a) If the given values of w variable are all equal then the Geometric Mean of the variable will be said as the 'Common Value' of the variable.

(b) The Logarithm value is the Arithematical Mean of Log values of the variable.

(c) If x is such an function of y so that $y = ax$, then the relation between geometric mean of the value of y and the avarage of the values of x will be $y_G = ax_G$

d) The ratio of G.M. of two variables will be equally proportimets to the two variables

i.e., $x_G \quad y_G = \left(\frac{x}{y}\right)_G$

Examples :

Groups	:	A	B	C	D	E	F
Group indicator	:	118	120	97	107	111	93
Value	:	4	1	2	6	5	2

Geometric Mean Calculation

Groups	Group Indicator (x)	Value (f)	$\log x$	$f(\log x)$
A	118	4	2·0719	8·2876
B	120	1	2·0792	2·0792
C	97	2	1·9868	3·9736
D	107	6	2·0294	12·1764
E	111	5	2·0453	10·2265
F	93	2	1·9685	3·9370
Total	—	20	—	40·6803

$$\log (G.M) = \frac{1}{N}\sum_{i=1}^{n} f_i(\log x_i) = \frac{40\cdot6803}{20} = 2\cdot0340$$

$\therefore$ G = anti log 2·0340 = 108·1

General average indicator is 108·1

(w) **Harmonic Mean :** A data set of a variable Translation.

If the n number of values of a variable x is $x_1, x_2 \ldots x_n$ then the Harmonic Mean of the variable can be expressed as per the following.

H $\quad M\dfrac{n}{\frac{1}{x_1}+\frac{1}{x_2}+\ldots+\frac{1}{x_n}} = \dfrac{n}{\sum_{i=1}^{n}\left(\frac{1}{x_1}\right)}$ If the ওরুত্ব ? of the corresponding values of n number data are $f_1, f_2, \ldots f_n$ then the significant harmonic mean can be expressed as per the following :

$$\text{H. M} = \frac{n}{\frac{f_1}{x_1}+\frac{f_2}{x_2}+\ldots\frac{f_n}{x_n}} = \frac{n}{\sum\frac{f_i}{x_i}} \text{ where}$$

$n = f_1 + f_2 \ldots f_n$ and the value of data set is not zero.

The use of Harmonic mean is very limited. But this scale exphasises most importance on the smallest data and gives less importance to the largest data. When the data set is huge or very much little the results obtain from harmonic mean is more acceptable than geometric mean as ...?

Example : Calculate the average speed of a motor car which covers a distance of 50

miles four times at different speed at different time. At first 50 miles per hour, then 20 miles/ hrs. 3rd time 40 miles/ hrs. and at last (4th time) 25 miles/hrs.

Solution : The average opend of the motor car can be calculated by Harmonic

$$\text{Mean : (H.M)} = \frac{4}{\frac{1}{50}+\frac{1}{20}+\frac{1}{40}+\frac{1}{25}} = \frac{800}{27} = 30 \text{ miles per hr.}$$

(x) **Median :** The median of values of a variable is the middle most value of the variable arranged either in ascending or discending manner. The median virtually devides the data set in such a way that each part is slightly higher or lower than the other part.

If the sum of data yields an odd number then the number at the middle of the data set will be considered as median but if the data yields an even number then there will be two such numbers which will stand in the middle of the data set. In this case the Arithmetic Mean of these to sumer is the median. If the number of variable is 2n + 1 (odd) then if the values arranged in ascending or discending manner then (n + 1)th number will be median. On the other side if the sum of the values are even number i.e., 2n the median will be the Arithmatic Mean of n^{th} and (n + 1). As the median is unipositional therefore median is known to be the positional average.

Example : 47, 49, 52, 80, 82, 109, 112 in this series of numbers the numeral is odd i.e., 2n + 1 = 7 or 2n = 6 or n = 3. Therefore n + 1th number or (3 + 1 = 4) i.e., 4th place number 80 is the median of this series. If anohter number say 40 is included in this series then. It becomes an even number series in that case. 2n = 8 or n = 4 i.e., the Arithmatic Mean of 4th place number 52 and 5th place number 80 i.e., 66 is the median.

It is simple to calculate the median of a frequency distribution of discrete variable. In this method the corresponding cumulative frequency of all the unique value numbers are calculated. If the total frequency is N then the cumulative frequency is $\frac{N+1}{2}$ will be the median.

In case of frequency distribution of a continuous variable the calculation of median is the differences of frequency distribution of the class boundaries the equation is as follows.

$$\text{Median} = L_1 + \frac{\frac{n}{2} - F}{f_m} \times c$$

Where N is the total number of observation.

L_1 is the lower limit of the model class.

F is the sum of frequency or the cumulative frequency of previous class of L_1.

f_m is the class frequency of median.

c is the length of median.

Example : Calculate median from the following frequency distribution in case of a discrete variable.

x :	0	1	2	3	4	5	6	Total
f :	7	44	35	16	9	4	1	116

Solve : Table for the calculation of median

x	f	cumulative frequency
0	7	7
1	44	51
2	35	86
3	16	102
4	9	111
5	4	115
6	1	116 = N

Example 2 : Calculate the median from the following frequency distribution in case of a continuous variable.

Class boundary :	15-25	25-35	35-45	45-55	55-65	65-75
Frequency :	4	11	19	14	0	2

Table for Median Calculation

Class boundaries	Frequency f	Cumulative frequency (less than type)
15-25	4	4
25-35	11	15
(35-45)	19	34
45-55	14	48
55-65	0	48
65-75	2	50 = N

Solve : $\frac{N}{2}=\frac{50}{2}=25$, যেহেতু $15 < 25 < 34$ middleclass is (35 – 45)

$\therefore L_1=35,\ N=50,\ F=15,\ F_m=19,\ c=10$

$$\text{Middle} = 35+\frac{25-15}{19}\times 10=35+5\cdot 26=40\cdot 26$$

(y) Mode : The highest frequency of a particular number of a variable is known as mode. In some frequency distribution there are many number of mode. The frequency distribution that has a single mode is known as unimodal frequency distributions.

It is very easy to calculate the mode from a frequency distribution of a discrete variable.

The highest frequency of a particular value of a variable can be easily identified by observing the frequency distribution table.

It is a bit difficult to calculate the mode from a frequency distribution of a continuous variable. It can be calculated as per the following equation :

$$\text{Mode} = L_1+\frac{f_1-f_0}{2f_1-f_0-f_2}\times i$$

or $L_1+\frac{d_1}{d_1+d_2}i$ where $f_1-f_0=d_1$

and $f_1-f_2=d_2$

Where L_1 mode is the lowest class range.

f_1 mode is the class frequency.

f_0 mode is the previous class frequency.

f_2 mode is the class frequency of next class.

The highest number of frequency distribution is the class mode of a class.

Example : ...

The monthly profit frequency of 100 shops are :

Profit of each shop :	0-100	100-200	200-300	300-400	400-500	500-600
Number of shops (f) :	12	18	27	20	17	6

Solution : Mode is (200-300) because the highest frequency of this corresponding class is 27

$l_1 = 200, f_1 = 27, f_0 = 18, f_2 = 20, C = 100$ and $d_1 = f_1 - f_0 = 9$

$d_2 = f_1 - f_2 = 27 - 20 = 7$

$\therefore$ Calculated Mode $= 200 + \frac{9}{9+7} \times 100 = 200 + 56 \cdot 25 = 256 \cdot 25$

In case of unimodal frequency distribution the relation is mentained between Arithmatic Mean, Median and Mode as per the following :

Arithematic Mean – Mode = 3 (Arithematic Mean – Median)

The relation between Arithematic Mean, Geometric Mean, and Harmonic Mean is as follows :

Arithmatic Mean $\geq$ Geometric Mean $\geq$ Harmonic Mean.

If the data set are arranged in order then the middle value becomes the median, similarly different measures in relation to the positional value of the variable can be termed as quartiles or Percentiles. If the different values of a variable are arranged in ascending order then three quartilies can be obtained. Let us assume that the n number of values of a variable has been arranged in ascending order take numerical value of the $\frac{n+1}{4}$ th position will be First Quartile, similarly the 2nd (second) quartile will be the median and $\frac{3(n+1)}{4}$ th position's value will be 3rd quartile.

The percentiles can also be expressed in the similar fashion.

(z) Measures of Dispersions : Generally the different values of a variable are not equal. Some time these values are quite close to each other and some times these are vast difference between them. To understand the characteristics of a data set it requeres to calculate their average as well as their proximity or difference and also it is required to have an idea as how they are scattered from the centre point. The technique measure through which the frequency distribution of a class of data sets characteristics and position such as their differences and how they are scattered from the median is called Measures of Dispersion. While discussing about dispersion the variation and deviation of different numbers are analysed.

Following are the different Measures of Dispersion :

1. Range
2. Mean Daviation
3. Standard Deviation

(AA) **Range :** Range is the simple it measures of Dispersion. The difference between the highest and lowest number of a data set is the Range of that class. It is quite easy

to calculate the Range, but this cannot be taken as perfect measure of dispersion because it is influenced by the highest and lowest numbers of a data set the other numbers are ignored. If a number of a data set is excessive high or low then the real structure (image) of the data set can not be expressed through Range.

Example : Suppose the values of variable are 4, 7, 2, 1, 3, 5, –3 calculate the Range :

Solution : The highest number = 7 and the lowest number = –3

Therefore Range of the variable = 7 – (–3) = 10

Example 2 : The relation between the two variable x and y are $3y + 4x = 9$ and the Range of x is 3, calculate the Range of y.

Solution : $3y + 4x = 9$

$$\text{or } y = 3 - \frac{4}{3}x$$

$$\therefore \text{ Range } (y) = \left|-\frac{4}{3}\right| \times 3 = 4$$

(AB) **Mean Deviation :** The Arithmatic Mean of the absolutes differences of Average of given values of a variable is the Mean Deviation. Suppose the n number of values of variable x is $x_1, x_2 ... x_n$ and c is the anticipated average therefore the Mean Deviation is

$$MD_c = \frac{1}{n}\sum_{i=1}^{n} |x_i = c|$$

$\because \sum_{i=1}^{n} (x_i - \bar{x}) = 0$ therefore Mean Deviation from Arithmatic Mean is virtually the absolute Mean Deviation.

if $\bar{x}$ is assigned for c then we obtain

$$\therefore AMD_{\bar{x}} = \frac{1}{n}\sum_{i=1}^{n} |x_i - \bar{x}|$$

If the n number of values of the variable is $x_1, x_2 ... x_n$ and their corresponding frequencies are $f_1, f_2 ... f_n$ then

$$AMD_{\bar{x}} = \frac{1}{n}\sum_{i=1}^{n} f_i |x_i = \bar{x}|$$

Similarly the Mean Deviation from Median – me is

$$MD_{me} = \frac{1}{n}\sum_{i=1}^{n} |x - me|$$

Example : 1 : If the weight of 6 person (in Kgs) are 64, 60, 60, 64, 60, 64 then calculate the absolute Mean Deviation of the basis of Arithematic Mean.

Solution : Arithmatic Mean $\bar{x}=\frac{60\times 3+64\times 3}{6}=62$

$$\therefore AMD_{\bar{x}}=\frac{1}{6}(3|60-62|+3|64-62|)=\frac{12}{6}=2 \text{ Kg.}$$

Example : 2 Caculate the Mean Deviation of a variable who's values from Median are 3, 9, 5, 1 and 2

Solution : The values in order are 1, 2, 3, 5, 9

$\therefore$ Median = 3

$$\therefore MDm_e=\frac{1}{5}(|1-3|+|2-3|+3-3|+|5-3|+|9-3|)$$

$$=\frac{11}{5}=2\cdot 2$$

(AC) **Some useful results of Absolute Mean Deviation :**

1. If the data set are given in the frequency table in the follwing methods can be use to calculate the Mean Deviation.

$$AMD_{\bar{x}}=\frac{2}{n}\sum_{x_i=1}^{n}(x_i-\bar{x})=\frac{2}{n}\sum_{x_i<1}(\bar{x}-x_i)$$

2. The Mean Deviation is always least if it is calculated on the basis of Median.

3 (i) $\frac{Mean\ Deviation\ from\ Arithematic\ Mean}{Mean\ Deviation}$ is the Coefficient of Mean Dispersion

(ii) $\frac{Mean\ Deviation}{Median}$ is the Coefficient of Median.

(AD) **Standard Deviation (SD) :** standard deviation (SD) is the scale of wide by used Range. The sum root of deviation is always a positive number given if the sum of deviation of different numbers of the arithematic mean of various values of a variable is zero. Therefore the numbers of Arithematic Mean and their deviation is and standard Deviation.

If n number of values of a variable are $x_1, x_2 \ldots x_n$ and if their Arithematic Mean is $\bar{x}$ then the Standard deviation (σ or SD) is

$$\sigma=SD=\sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i-\bar{x})^2}$$

If the data set is $x_1, x_2 \ldots x_n$ and their corresponding frequencies are $f_1, f_2 \ldots f_n$ then

$$\sigma = SD = \sqrt{\frac{1}{n} f_i \sum_{i=1}^{n} (x - \bar{x})^2}$$

To simplify the calculation the law of standard Deviation can be used in a different manner.

such as $\sum_{i-1}^{n} (x_i - \bar{x})^2 = \sum_{i=1}^{n} x_i^2 - 2\sum x_i . \bar{x} + n\bar{x}^2$

$$= \sum_{i-1}^{n} x_i^2 - n\bar{x}^2$$

$\therefore$ S.D or $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n} x_i^2 - \left(\frac{1}{n}\sum_{i=1}^{n} f_1 x_i\right)^2}$

Similarly the Standard Deviation for Frequency Distribution can be expressed as

S.D or $\sigma = \sqrt{\frac{1}{n} = \sum_{i=1}^{n} f_i x_1^2 - \left(\frac{1}{n}\sum f_i x_1\right)^2}$

$(S.D)^2$ or σ^2 is called variance.

$\therefore$ σ^2 or variable = $\frac{1}{n}\sum_{i=1}^{n} f_i x_i^2 - \left(\frac{1}{n}\sum f_i x_i\right)^2$

(AE) **Characteristics of Standard Deviation :**

1) If all the values of a variable are equal then the standard Deviation of those values will be zero. It can also be the opposite.

Let x variable has n number of values x_i (where i = 1 to n) = c for each i

therefore $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} c = c$

then $x_1 - \bar{x} = 0$

$$(S.D =)\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n} (x_i - \bar{x})^2} = \sqrt{\frac{1}{n} \times 0} = 0$$

Otherwise Let σ = 0

or, $\sigma^2 = 0$

or $\frac{1}{n}\sum (x_1 - \bar{x})^2 = 0$

or $\sum_{i=1}^{n} (x_1 - \bar{x})^2 = 0$ this is possible

if $x_1 = -\bar{x} = 0$

or, $x_1 = \bar{x}$ is for every i

Therefore if the standard deviation is zero then all the values of a variable will be equal.

ii) The Standard Deviation is independent of origin but it is dependant on the change of scale.

Proof : Let the Standard of two variable x and y is $y = a + bx$ and the standard deviation of two variable is σ_x, σ_y where a is the origin and b is scale.

$y = a + bx$

Therefore $y_i = a + bx$, $i = 1, 2 \ldots n$

then $\bar{y} = a + b\bar{x}$

Therefore $(y_1 - \bar{y}) = b(x_1 - \bar{x})$ for each i

$$\therefore \sum_{i-1}^{n} (y_1 - \bar{y})^2 = b^2 \sum_{i=1}^{n} (x_1 - \bar{x})^2$$

$$\text{or } \frac{1}{n}\sum_{i-1}^{n} (y_1 - \bar{y})^2 = b^2 \frac{1}{n}\sum_{i-1}^{n} (x_1 - \bar{x})^2$$

or, $\sigma y^2 = b^2 \sigma x^2$

or $\sigma y = |b| \sigma x$

Therefore the origin of standard deviation (= a) is independent but dependant on the scale (= b). It all the values are multiplied or devided by a constant then the standard deviation will also gets accordingly influenced.

(iii) If a class has n_1 number of values and their Arithematic Mean and subsequent standard Deviation is $\bar{x}_1$ and σ_1 and the other class has n_2 number of values and accordingly their A.M. and S.D. are $\bar{x}_2$ and σ_2 then the Standard Deviation of the complete data set will be obtained from the following equation.

$$N\sigma^2 = (n_1 {\sigma_1}^2 + n_2 {\sigma_2}^2) + (n_1 {d_1}^2 + n_2 {d_2}^2)$$

where $\bar{x} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2}{n_1 + n_2}, n_1 + n_2 = N1, d_1 = \bar{x}, -\bar{x}\, d_2 = \bar{x}_2 - \bar{x}$

This equation can be expressed in a simpler way.

$$N\sigma^2 = \sum n_1 \sigma i^2 + \sum n_i {d_i}^2$$

Where $d_i = \bar{x}_i - \bar{x}$, $N = \sum n_i$ and $\bar{x}$ is the corelated Arithematic Mean or $N\bar{x} = \sum n_i \bar{x}_i$

Example : Calculate the Standard Deviation from the marks Frequency table of 90 students.

Obtained Marks	:	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Number of students	:	5	12	15	20	18	10	6	4

[I.C.W.A. June '76]

Table for calculating Standard Deviation

Class difference	Frequency	Median (x)	$y = \frac{x - 54{\cdot}5}{10}$	f_y	f_y^2
(1)	(2)	(3)	(4)	(5)	(6)
20-29	5	24·5	–3	–15	45
30-39	12	34·5	–2	–24	48
40-49	15	44·5	–1	–15	15
50-59	20	54·5	0	0	0
60-69	18	64·5	1	18	18
70-79	10	74·5	2	20	40
80-89	6	84·5	3	18	54
90-99	4	94·5	4	16	64
Total	90	—	—	18	284

$y = \frac{x - a}{b}$, then $\sigma_x = b\sigma_y$, here the 4th column $y = \frac{x - 54{\cdot}5}{10}$

Therefore a = 54·5 and b = 10

$$\sigma^2_y = \frac{\sum f_y^2}{N} - \left(\frac{\sum f_y}{N}\right)^2 = \frac{284}{90} - \left(\frac{18}{90}\right)^2 = 3{\cdot}156 - {\cdot}04 = 3{\cdot}116$$

$$\sigma_y = \sqrt{3{\cdot}116} = 1{\cdot}77$$

$$\therefore \sigma_x = 10 \times 1{\cdot}77 = 17{\cdot}7$$

In case of Standard Deviation $\left(\frac{Standard\ Difference}{Arithematic\ Mean}\right)$ is the coefficient dispersion. Sometimes the coefficient dispersion is expressed in terms of percentage. It is the termed as coefficient of variation.

therefore coefficient of variation = $\frac{standard\ deviation}{Arithematic\ Mean} \times 100$

Exercise

1. ... ...

2. Differential between Discrete variable and continuous variable, with example.

3. **Explain :** Class boundary, class limit, frequency density, class mark.

4. Write the Defination of Histogram and explain how it is drawn?

5. What is Ogive? How will you draw it?

6. Draw an Ogive and a Histogram for the following frequency distribution.

Height of Students (in centimeter) :	2	3	4	5	6	7	8	9	10
Number of students :	9	12	21	26	17	9	3	2	1

7. Prepare a frequency distribution from the following data set.

7, 4, 3, 5, 6	3, 3, 2, 4, 3	4, 3, 3, 4, 4
3, 2, 2, 4, 3	5, 4, 3, 4, 3	4, 3, 1, 2, 3

8. Calculate the Arithematic Mean, Median and Mode for number of telephone calls for every minute

Number of Telephone calls :	0	1	2	3	4	5	6	7	8
Frequency	1	22	31	43	51	40	35	15	3

[Ans. 3-90,4,4]

9. The Arithematic Mean of the following Frequency distribution is 67·45 inch. calculate the f_1

Height (in inches) :	60-62	63-65	66-68	69-71	72-74
Frequency :	15	54		81	24

[Ans. 126]

10. Calculate the Median from the following data set :

Class mark :	115	125	135	145	155	165	175	185	195	Total
Frequency :	6	25	48	72	116	60	38	22	3	390

[Ans : 153.8]

11. Calculate the Mean Deviation from Median for the following data set.

Class difference :	2-4	4-6	6-8	8-10
Frequency :	3	4	2	1

[Ans.: 1·4]

12. Calculate the Arithematic Mean and Standard Deviation from the following Frequency Distribution.

Score	:	4-5	6-7	8-9	10-11	12-13	14-15	Total
Frequency	:	4	10	20	15	8	3	60

[Ans : 9.23; 2.48]

2.3 Analysis of Bivariate Data

When the data of two variable is simultaneous by recorded for a particular sect or group then the data set is called Bivariate Data.

Examples of Bivariate Data are : Simultaneous information about the height and weight of the students of a class, or Rain fall and yield of crop per acre of a particular area of zone, or, the Income and expenditure data of some families. In requires to adopt new methodology to analyse the dataset of two variable at a time. Actually the various measurements like scale, avarage, standard deviation of each variable is done separately to tackle the bivariate data. Two major aspects are to be considered while analysing a bivariate data. Firstly, if there is any association between the two variable when the limit and nature of association is to be judged. Secondly, if it is found that there is an association between the two variable then one of them is tagged as dependent variable and the other one is considered as independent variable and accordingly the value of dependent variable is judged for every values of the independent variable. The subsequent changes in the values of two variables are analysed this is known as correlation analysis. The coefficient which is concieved while correlation analysis is called correlation co-efficient. In the 2nd phase of analysis where the two variables requires to be expressed with a mathematicl অপেক্ষক this is known as Analysis of regression. Discussion on Bivariate data is actualy Bivariate Analysis.

(A) **Bivariate Friquency distribution :** When the volume of bivariate data becomes quite heavy the they are serialised by a bi-directional frequency table. This type of bi-directional frequency distribution is known as Brivariate Frequency Distribution. Appropriate number of classes are to be taken to prepare this kind of frequency distribution. Suppose x and y variable has n pair of values. If k number of class is taken for x and L number of class is taken for y then the bivariable table will have KXL, number of cells and the bivariate frequency distribution will be prepared with the frequency of entire class.

The following is the Frequency Distribution table of bivariate data :

Table No. 3.1

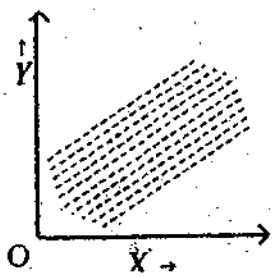
Bivariate Frequency distribution where n number of values of variable x and y has been accumulated

x \ y	y_0–y_1	y_1–y_2	.....	y_{j-1}–y_j	....	y_{l-1}–y_L	Total
x_0–x_1	f_{11}	f_{12}		f_{1j}		f_{1L}	f_{10}
x_1–x_2	f_{21}	f_{22}		f_{2j}		f_{2L}	f_{20}
. . . .							
. . . .							
x_{i-1}–x_i	f_{i1}	f_{i2}		f_{ij}		f_{iL}	f_{i0}
. . . .							
. . . .							
x_{k-1}–x_k	f_{K1}	f_{K2}		f_{Kj}		f_{KL}	f_{K0}
Total	f_{01}	f_{02}	. . . .	f_{0j}		f_{0L}	n

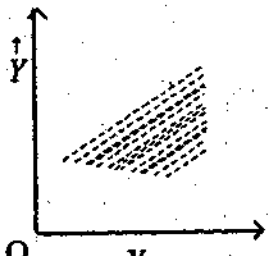
Here $f_{i0} = \sum f_{ij}$ and $f_{0j} = \sum_{ij}$

In the above table the row totals of the frequencies are not the value of y but the values of x. Therefore the first column and the last these two columns are the frequency distribution of variable x, which is the marginal distribution of x for a bivariate distribution. Similarly first and last these two columns are the frequency distribution of variable y and this is the Marginal distribution of y. On the other hand any column of the frequency table that expresses the given value of y can express the number of values of different classes of x. This is arrange of distribution of y for given x.

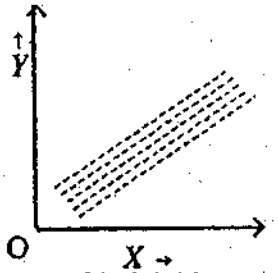
(B) **Scatter Diagram :** The pictorial presentation of bivariate data set is known as scatter diagram. Suppose n pairs of values are assigned for variable x and y. Both of the values of horizontal axis x and vertical axis y can be identified by single joint (dot). When a diagram is drawn for n pairs of values then it is called scatter diagram. Following are few examples of scatter diagram.



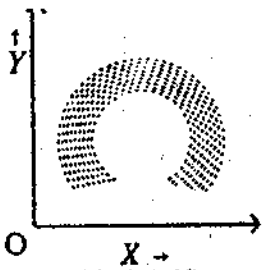
Pic 3.1 (a)



Pic 3.1 (b)



Pic 3.1 (c)



Pic 3.1 (d)

The nature and intensity and interrelation between the two variables can be guessed from a scatter diagram. There are four types of bivariate data set which has been shown in the scatter diagram 3.1 (a) to 3.1 (d).

The first three scatter diagram shows linear association between the two variable x and y, and the 4th (3.1d) scatter diagram shows the non-linear association between x and y.

(c) **Correlation :** Correlation means the interrelation and inter dependency between the two variables. It the relation between the two variable are such that change of volume of magnitade of one affects the other then they are called correlated variables. Correlation may be or may not be simple.

If the avarage of two variable x and y changes in the same direction then it is said to be positive correlation between the variables. In such situation the correlation coefficient ($= r_{xy}$) is always positive. On the other side if the average of two variable changes in opposite direction then it is said to be Negative correlation between them and then the correlation coefficient becomes negative.

If change in the value of a vairable does not effect the other then it is said that these is no correction between the two variables and then the correlation coefficient value becomes zero ($r_{xy} = 0$).

(d) **Product moment correlation coefficient or Karl Pearson's Coefficient of Correlation :** The product moment correlation coefficient is basically a sort of measure of the simple relation between to variables. The correlation coefficient between the two variable x and y is denoted by r_{xy} or just r and it can be defined as per the following :

$$r_{xy} = \frac{covariance\,(x,y)}{\sqrt{(variance\,x)\;(variance\,y)}}, \quad \left[r_{xy} = \frac{cov\,(x,y)}{\sqrt{var\,x\;var\,y}} \right]$$

If (x_i, y_i) $(i, 2 \ldots n)$ then the n number of twin value of the variable x and y will be

$$\text{Cov}\,(x, y) = \text{Covariance}\,(x,y)\,\frac{1}{n}\sum_{i=1}^{n}\,(x_i - \bar{x})\,(y_i - \bar{y})$$

Where $\bar{x}$ and $\bar{y}$ are the arithematic Mean of x and y

$$= \frac{1}{n}\sum_{i=1}^{n}\,x_i y_i - \bar{x}\bar{y}$$

$$= \frac{1}{n}\sum_{i=1}^{n}\,x_i y_i - \left(\frac{1}{n}\sum_{i=1}^{n}\,x_i\right)\left(\frac{1}{n}\sum_{i=1}^{n}\,y_i\right)$$

$$= \frac{1}{n^2}\left[n\sum_{i=1}^{n}\,x_i y_i - \left(\sum_{i=1}^{n}\,x_i\right)\left(\sum_{i=1}^{n}\,y_i\right)\right]$$

Var (x) = variance (x) $= \frac{1}{n}\left(\sum_{i=1}^{n}(x_1-\bar{x})^2\right)=\frac{1}{n}\sum_{i=1}^{n}x_1^2-\bar{x}^2$

$$=\frac{1}{n}\sum_{i=1}^{n}x_1^2-\left(\frac{1}{n}\sum_{i-1}^{n}x_1\right)^2$$

Similarly, $$=\frac{1}{n^2}\left[n\sum_{i-1}^{n}x_i^2-\left(\sum_{i=1}^{n}x_i\right)^2\right]$$

Var (y) - variance (y) $$=\frac{1}{n^2}\left[n\sum_{i=1}^{n}y_i^2-\left(\sum_{i=1}^{n}y_i\right)^2\right]$$

$$\therefore r_{xy} \quad =\frac{\frac{1}{n}\sum_{i-1}^{n}x_iy_i-\bar{x}\bar{y}}{\sqrt{\frac{1}{n}\sum_{i-1}^{n}x_i^2-\bar{x}^2}\sqrt{\frac{1}{n}\sum_{i=1}^{n}y_i^2-\bar{y}^2}}$$

$$=\frac{n\sum_{i=1}^{n}x_iy_i-\left(\sum_{i=1}^{n}x_i\right)\left(\sum_{i=1}^{n}y_i\right)}{\sqrt{n\sum_{i=1}^{n}x_i^2-\left(\sum_{i=1}^{n}x_i\right)^2}\sqrt{n\sum_{i=1}^{n}y_1^2-\left(\sum_{i=1}^{n}y_i\right)^2}}$$

The above equation is very much useful to calculate the coefficient of correlaction of such data set who are not classified.

The correlation coefficient of two variable can be expressed as per the following :

$$r_{xy}=\frac{\frac{1}{n}\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sigma_x\sigma_y}$$

where the Arithematic Mean of the two variable x and y are, $\bar{x}$, $\bar{y}$ and their standard deviation is σ_x, σ_y

(E) **Properties of Correlation Coefficient** : (a) The correlation coefficient of any two variable is pure number. That means the independent of units of measurement of the variable this characteristics of correlation coefficient can be sighted from the definition of correlation coefficient.

(b) The correlation coefficient of the two variable x and y is γ_{xy} which is virtually symmatric of x and y i.e. $\gamma_{xy} = \gamma_{yx}$.

(c) The numerical value of correlation coefficient is independent of the change of origin and sales of the variables.

Proof : Let (x_i, y_i), $(i = 1, 2 \ldots n)$ are the different values of x and y the two new variable are u an v is taken where $u = \frac{x-a}{c}$ and $v = \frac{y-b}{d}$ and a, b, c, d are any of the constant and $c \neq 0$ and $d \neq 0$

$$u_1 = \frac{x_i - a}{b}, \; v_i = \frac{y_i - b}{d}$$

$$\therefore x_i = a + cu_i$$

and $\bar{x} = a + c\bar{u}$

$$\therefore x_i - \bar{x} = c(u_1 - \bar{u})$$

$$\ldots, \; y_i - \bar{y} = d(v_i - \bar{v})$$

$$\ldots\ldots (x) \quad = \frac{1}{n}\sum_{i=1}^{n} (x_i - \bar{x})^2$$

$$= \frac{c^2}{n}\sum_{i=1}^{n} (u_i - \bar{u})^2$$

$$= c^2 \ldots (u)$$

$$\ldots. (x) \quad = \frac{1}{n}\sum_{i-1}^{n} (y_i - \bar{y})^2$$

$$= \frac{d^2}{n}\sum_{i-1}^{n} (v_i - \bar{v})^2 = d^2 \ldots (v)$$

$$\ldots\ldots (x, y) \quad = \frac{1}{n}\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})$$

$$= \frac{cd}{n}\sum_{i=1}^{n} (u_i - \bar{u})(v_i - \bar{v})$$

$$= cd \ldots. (u, v)$$

.....

.....

.....

.....

.....

$$\therefore r = \frac{\frac{1}{n}\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sigma_x\sigma_y}$$

$$\text{or } r=\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i-\bar{x}}{\sigma_x}\right)\left(\frac{y_i-\bar{y}}{\sigma_y}\right)$$

$$\text{or } r=\frac{1}{n}\sum_{i=1}^{n}p_iq_i \text{ when } p_i=\frac{x_i-\bar{x}}{\sigma_x},\ q_i=\frac{y_i-\bar{y}}{\sigma_y}$$

$$\therefore \sum_{i=1}^{n}p_iq_i=nr$$

$$\text{or } \sum_{i=1}^{n}p_i^2=\sum_{i=1}^{n}\left(\frac{x_i-\bar{x}}{\sigma_x}\right)^2=\frac{1}{\sigma_x^2}\sum_{i=1}^{n}(x_i-\bar{x})^2$$

$$=\frac{n\sigma_x^2}{\sigma_x^2}=n$$

and also,

$$\sum_{i=1}^{n}q_i^2=n$$

Now $\sum_{i=1}^{n}(p_i+q_i)^2 \geq 0$ As squarres of real numbers are always either possitive of zero

$$\text{or } \sum_{i=1}^{n}p_i^2+\sum_{i=1}^{n}q_i^2+2\sum_{i=1}^{n}p_iq_i\geq 0$$

$$\text{or } n+n+24r\geq 0$$

$$\text{or } 2n(1+r)\geq 0$$

$$\text{or } 1+r\geq 0$$

$$\therefore r\geq -1 \quad \text{... (i)}$$

$$\ldots \sum_{i=1}^{n}(p_i-q_i)^2\geq 0$$

$$\text{or } \sum p_i^2\sum q_i^2-2\sum_{i=1}^{n}p_iq_i\geq 0$$

$$\text{or } n+n-2rn\geq 0$$

or $2n(1-r) \geq o$

or $1-r \geq 0$

or $r \leq 1$ ...(i)

(i) and (ii) From it follows that — $1 \leq r < 1$

(F) **Computation of Correlation Coefficient from Grouped Data) :** Suppose n number of values of x and y has been given in a bivariate frequency table where the class difference for x is K and the same for y is L and their corresponding frequences has been oriented. Suppose f_{ij} is the frequency of cell (i, j) where $i = 1, 2 \ldots K$ and $J = 1, 2, \ldots L$ now if x_1 and y_1 are the mid value for i class of x and j clanth of y then....

$$r_{xy} = \frac{\frac{1}{n}\sum_{i=1}^{K}\sum_{j=1}^{L} f_{ij}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\frac{1}{n}\sum_{i=1}^{K} f_{io}(x_i - \bar{x})^2}\sqrt{\frac{1}{n}\sum_{j=1}^{n} f_{oj}(y_i - \bar{y})^2}}$$

where $f_{io} = \sum_{j=1}^{L} f_{ij}, f_{oj} = \sum_{i=1}^{K} f_{ij}, \bar{x} = \frac{1}{n}\sum_{i=1}^{K} f_{io}x_i$

and $\bar{y} = \frac{1}{n}\sum_{j=1}^{L} f_{oj}y_j$

... .

Let $u = \frac{x-a}{c}$ and $v = \frac{y-b}{d}$ where a, b is .... x and y-... .....

$$\therefore r_{xy} = r_{uv} = \frac{\frac{1}{n}\sum_{i}^{K}\sum_{j}^{L} f_{ij}(u_i - \bar{u})(v_j - \bar{v})}{\sqrt{\frac{1}{n}\sum_{i}^{K} f_{io}(u_i - \bar{u})^2}\sqrt{\frac{1}{n}\sum_{j}^{L} f_{oj}(v_j - \bar{v})^2}}$$

$$= \frac{\frac{1}{n}\sum_{i}^{K}\sum_{j}^{L} f_{ij}u_iv_i - \bar{u}\bar{v}}{\sqrt{\frac{1}{n}\sum_{i}^{K} f_{io}u_i^2 - \bar{u}^2}\sqrt{\frac{1}{n}\sum_{i}^{L} f_{oj}v_j^2 - \bar{v}^2}}$$

$$= \frac{\frac{1}{n}\sum_{i}^{K}\sum_{j}^{L} f_{ij} - \left(\sum_{i}^{K} f_{io}u_i\right)\left(\sum_{j}^{L} f_{oj}v_j\right)}{\sqrt{n\sum_{i}^{K} f_{io}u_j^2 - \left(\sum_{i}^{K} f_{io}u_i\right)^2}\sqrt{n\sum_{j}^{L} f_{oj}v_j^2 - \left(\sum_{j}^{L} f_{oj}v_j\right)^2}}$$

Example 1 : Calculate the correlation coefficient of husband and wife from the following data.

H :	23	27	28	29	30	31	33	35	36	39
W :	18	22	23	24	25	26	28	29	30	32

[I.C.W.A.]

Solution : Suppose age of Husband is x and age of Wife is y.

Solve : Suppose age of Husband is x and age of Wife is y.

Table for Calculating of Correlation coeficient

x	y	$u = x-31$	$v = y-25$	u^2	v^2	uv
(1)	(2)	(3)	(4)	(5)	(6)	(7)
23	18	–8	–7	64	49	56
27	22	–4	–3	16	9	12
28	23	–3	–2	9	4	6
29	24	–2	–1	4	1	2
30	25	–1	0	1	0	0
31	26	0	1	0	1	0
33	28	2	3	4	9	6
35	29	4	4	16	16	16
36	20	5	5	25	25	25
39	32	8	7	64	49	56
Total 311	257	1	7	203	163	179

The number of husband and wife is $n = 10$

$$r_{xy} = r_{uv} = \frac{\text{couariance}(u,v)}{\sigma_u \sigma_v} = \frac{\frac{179}{10} - \frac{1}{10}\cdot\frac{7}{10}}{\sqrt{\frac{203}{10} - \left(\frac{1}{10}\right)^2}\sqrt{\frac{163}{10} - \left(\frac{7}{10}\right)^2}}$$

$$= \frac{1790-5}{\sqrt{2030-1}\sqrt{1630-49}} = \frac{1783}{\sqrt{2029}\sqrt{1581}} = \frac{1783}{\sqrt{3207849}}$$

$$= \frac{1783}{1791\cdot0469} = \cdot9955 + \cdot996 \ (...)$$

Example 2 : The number obtained by students in English (=x) and in Mathematics (=y) are shown in the following bivariate frequency distribution table. From the table find out the coefficients of in English and Mathematics.

x \ y	5-20	20-25	25-30	30-35	35-40	Total
0-20	4	2				
20-40	6	5	3	1		
40-60		9	4	2	1	
60-80		7	4	1		
80-100			1			
Total	10	23	12	4	1	50

Table for calculating the coefficient for obtained number in English and Mathamatics

Class-mark (x_i) / Class-mark (y_j) \ ui / v_j	17·5	22·5	27·5	32·5	37·5	f_{oi}	$f_{oj}\ v_j$	$f_{oj}\ v_j^2$	u_j	$v_j u_j$
	–2	–1	0	1	2					
10 –2	4	2				6	–12	24	–10	20
30 –1	6	5	3	1		15	–15	15	–16	16
50 0		9	4	2	1	16	0	0	–5	0
70 1		7	4	1		12	12	12	–6	–6
90 2			1			1	2	4	0	0
f_{io}	10	23	12	4	1	50	–13	55	–37	30
$f_{io}\ u_i$	–20	–23	0	4	2	–37				
$f_{io}\ u_i^2$	40	23	0	4	4	71				
v_i	–14	–2	3	0	0	–13				
$u_i\ v_i$	28	2	0	0	0	30				

Check

$$r_{xy} = r_{uv} = \frac{50\sum_i u_i v_i - \left(\sum_i v_i\right)\left(\sum_k u_j\right)}{\sqrt{50\sum f_{io} u_j^2 - \left(\sum_j u_j\right)^2}\sqrt{50\sum_j f_{oj} v_j^2 - \left(\sum_i v_i\right)^2}}$$

$$= \frac{50\times 30-(-13)\times(-37)}{\sqrt{50\times 71-(-37)^2}\sqrt{50\times 55-(-13)^2}} = \frac{1019}{\sqrt{2181}\sqrt{2581}}$$

$$= \frac{1019}{46\cdot 70\times 50\cdot 80} = 0.43$$

(G) **Rank correlation co-efficient :** When a group of individuals are oriented / organised on the basis of some characteristics of quality then it is oaid to considered as they have been arranged according to the rank. The particular place number where a group of individuals stays. Within this type of arrangement is known as the ordinal number and that place number is considered as rank.

It becomes interesting to find correlation between the ranks when a group of individual is assigned with two rank values for their corresponding characteristics and quality. The correlation between then are known as Rank correlation and the corresponding co-efficient is known as Rank correlation coeffificient.

(H) **Spearman's rank Correlation Coefficient :**

(a) Case when there are no ties.

Suppose n number of individuals rank have two classes and they are $u, u_2 \ldots u_n$ and $v_1, v_2 \ldots v_n$. Since the rank values does not accept any thing other than 1, 2 ... n and u and v are variables with two different values therefore u_1 *and* v_1 are permutation of n natural members more so $d_1 = u_1 - v_1$ where $i = 1, 2 \ldots n$ then the spearman's rank correlation coefficient which is mark by r_R can be represanted as

$$r_R = 1 - \frac{6\sum d_1^2}{n^1(n^2-1)}$$

When there is a perfect cooperation between the rank values of two classes i.e., the rank values are same then the association between the two variables are said to be positively perfect. In such case for every $i = v_1 = v_1$ and $\sum d_1^2 = 0$ therefore $r_R = 1$.

On the otherside when is no perfect arragement between the rank values (i.e., $u_1 \neq v_i$) then they are said to be negatively perfect. Where for every i $vi = n - u_1 + 1$.

$$\text{and } \sum_i d_i^2 = \sum_i (2u_i - n - i)^2$$

$$= 4\sum_i u_i^2 - 4(n+1)\sum_i u_i + n(n+1)^2$$

$$= 4.\frac{n(n+1)(2n+1)}{6} - 4(n+1)\frac{n(n+1)}{2} + (n+1)^2$$

$$= \frac{2}{3}n((n+1)(2n+1) - n(n+1)^2$$

$$= \frac{1}{3}n(n^2+1)$$

$$\therefore r_R \quad = 1 - \frac{6n(n^2-1}{3}.\frac{1}{n(n^2-1)} = 1-2 = -1$$

Taking different values of variable u_i and v_i the Simple product moment correlation coefficient will yield spearman's rank correlation coefficient.

Since rank valuble do no assure values other than 1, 2, ...n.

$$\because \sum_i u_i = \sum v_i = 1+2+...+n = \frac{n(n+1)}{2}$$

$$\therefore \bar{u} = \bar{v} = \frac{n+1}{2}$$ where $\bar{u}$, $\bar{v}$ are respectively arithematic mean of u_i and v_i

the difference value of u, σ_u^2 and the difference value of v is σ_v^2 which are as follows :

$$\sigma_u^2 \quad = \frac{1}{n}\sum_i (u_i - \bar{u})^2$$

$$= \frac{1}{n}\sum u^2 - \bar{u}^2$$

$$= \frac{1}{n}\frac{n(n+1)(2n+1)}{6} - \left(\frac{n+1}{2}\right)^2$$

$$= \frac{(n+1)(2n+1)}{6} - \frac{(n+1)^2}{4} = \frac{n^2-1}{12}$$

Similarly, .

$$\sigma_v^2 = \frac{n^2-1}{12}$$

so, $\frac{1}{n}\sum_i d_i^2 \quad = \frac{1}{n}\sum_i (u_i - v_i)^2$

$$= \frac{1}{n}\sum_{1} \{(u_i - \bar{u}) + (v_i - \bar{v})\}^2 \quad (\because \bar{u} = \bar{v})$$

$$= \frac{1}{n}\sum_{i} (u_i - \bar{u})^2 + \frac{1}{n}\sum (v_i - \bar{v})^2 - \frac{2}{n}\sum_{i} (u_i - \bar{u})(v_i - \bar{v})$$

$$= \sigma_u^2 + \sigma_y^2 - 2 \text{ covariance } (u, v)$$

$$\therefore \text{ covariance } (u, v) = \frac{\sigma_u^2 + \sigma_v^2 - \frac{1}{n}\sum_{i} d_i^2}{2}$$

$$= \frac{n^2 - 1}{12} - \frac{1}{2n}\sum_{i} d_i^2$$

$$\therefore r_{uv} = \frac{\text{covariance } (u,v)}{\sigma u \ \sigma v} = \frac{\frac{n^2 - 1}{12} - \frac{1}{2n}\sum_{i} d_i^2}{\frac{n^2 - 1}{12}}$$

$$= \frac{6\sum_{i} d_i^2}{n(n^2 - 1)} = r_R$$

(D) **When there are ties**

Suppose m has same number of rank value. Then it can be said that m length has a tie. This way there may be more than are tio in rank row. It is a special situation the group of individuals having an tie and their immidiate previous has a rank value r then each of the rank values within m number of individuals will be

$$\frac{(r+1) + (r+2) + \ldots + (r+m)}{m} = r + \frac{m+1}{2}$$

If they were not tied in this manner there the sum of square root of the rank values would have been S_1

$$S_1 = (r+1)^2 + (r+2)^2 + \ldots (r+m)^2$$

$$= mr^2 + 2r(1 + 2 + \ldots + m) + (1^2 + 2^2 + \ldots m^2)$$

$$= \mathrm{mr}^2 + \mathrm{m(m+1)r} + \frac{1}{6}\mathrm{m(m+1)(2m+1)}$$

In this case the square root sum of the rank values have been S_2.

$$S_2 = m\left(r + \frac{m+1}{2}\right)^2$$

$$m\left[r^2 + m(m+1)r + \frac{1}{4}m(m+1)^2\right]$$

Now, $S_1 - S_2 = m(m+1)\left(\frac{2m+1}{6} - \frac{m+1}{4}\right) = \frac{m(m+1)(m-1)}{12} = \frac{1}{12}(m^3 - m)$

As the square of the rank value decreases by $\frac{1}{12}(\mathrm{m}^3 - m)$ So, the arithematic mean of rank value will remain unchanged but the difference value $\frac{1}{12m}(\mathrm{m}^3 - m)$ will decrease by

Suppose the rank values in case of a variable u are m_1, m_2 ... m_K lengthed which has K number of ties and in case of variable V the rank values are m'_1, m'_2 ... m'_L Lengthed which has L number of ties. Here the variance will be lesser in case of all corresponding ties and since the lying process is and additive process therefore the variance for both variables will be $\sigma_u^2 = \frac{n^2-1}{12} - Tu$ and $\sigma_v^2 = \frac{n^2-1}{12} - Tv$

where $Tu = \frac{1}{12n}\sum_{i=1}^{K}(m_i^3 - m_i)$ and $Tv = \frac{1}{12n}\sum_{i=1}^{L}(m_i'^3 - m_i')$

again since $\frac{1}{n}\sum_{i=1}^{n} d_1^2 = \sigma_u^2 + \sigma_v^2 - 2$ varuabce (u, v)

in case of rank values within bracket

variance $(u, v) = \frac{n^2-1}{12} - \frac{Tu+Tv}{2} - \frac{1}{2n}\sum_{i=1}^{n} d_i^2$

therefore, in case of bracketed rank values spearman's rank correlation co-efficient.

$$r_R = \frac{\frac{n^2-1}{12} - \frac{Tu+TV}{2} - \frac{1}{2n}\sum_{i=1}^{n} d_i^2}{\sqrt{\frac{n^2-1}{12} - Tu}\sqrt{\frac{n^2-1}{12} - TV}}$$

if there is perfect agreement between two between two rank values, then for every i $u_i = v_i$ and $d_i = 0$, $Tu = Tv$ and $\sigma_u = \sigma_v$

$\therefore r_R = 1$

there the relation between the two variable u and v can be expressed by a straight line. Whose inclination will be $r_R = 1$ that is positive.

If there is complete discrepancy between the two class of total rank value then $v_1 = n-u_1+1$ and the relation between the two variable u and v can be expressed by such a straight line, whose inclination will be negative i.e., $r_R = -1$.

In this context Kendall's correlation coefficient can be mentioned.

Example 1 : In a competetion 10 competitors have been segregated serially in two groups based on their rank which is shown below :

Calculate the rank correlation coefficient.

Competetors :	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1st :	6	11	9	3	7	10	5	2	8	4
rank :										
2nd :	4	9	11	5	10	8	2	3	7	6

Solve : Let the ranks of the two groups be u_i and v_i $(i = 1, 2..., 10)$ respectively. The table for the calculation of rank correlation coefficient is shown below :

u_i	v_i	$d_i = u_i - v_i$	d^2
6	4	2	4
11	9	2	4
9	11	–2	4
3	5	–2	4
7	10	–3	9
10	8	2	4
5	2	3	9
2	3	–1	1
8	7	–1	1
4	6	–2	4
Total			44

Number of Competitors = n = 10

$\therefore$ The required rank correlation coefficient is

$$r_{uv} = 1 - \frac{6\sum_{i}^{10} d_i^2}{n(n^2-1)} = 1 - \frac{6\times 44}{10(10^2-1)} = \frac{726}{990} = .73 \text{ (approved)}$$

Examples 2 : In an examination 9 students have obtained the following marks in English and Mathematics. Calculate the Spearman's rank correlation coefficient.

Student (Roll No) :	1	2	3	4	5	6	7	8	9
The marks in English :	45	60	32	45	32	32	58	56	47
The Marks in Mathematics :	51	51	38	54	54	38	62	58	38

Solve : The marks in English, say u_i, and those in Mathematics, say v_i, has been ranked shown below :

Roll No. :	1	2	3	4	5	6	7	8	9
English (u_i) :	$5\frac{1}{2}$	1	8	$5\frac{1}{2}$	8	8	2	3	4
Mathamtcis (v_i) :	$5\frac{1}{2}$	$5\frac{1}{2}$	8	$3\frac{1}{2}$	$3\frac{1}{2}$	8	1	2	8

There are three ties 2 and 3 in the series value of the first type (English)

$$\therefore T_u = \frac{1}{12n}[(2^3-2)+(3^3-3)]$$

$$= \frac{30}{12\times 9} = \frac{5}{18} = 0\cdot 2778$$

The second type (Mathematics) veries values has got three ties of 2, length for 2 and 3

$$\therefore T_v = \frac{1}{12n}[(2^3-2)+(3^3-3)+(2^3-2)] = \frac{36}{12\times 9} = \frac{1}{3} = 0\cdot 3333$$

again $\frac{n^2-1}{12} = \frac{80}{12} = \frac{20}{3} = 6\cdot 6667$

and $\frac{1}{2n}\sum d_i^2 = \frac{1}{2\times 9}\left[0+\frac{81}{4}+0+4+\frac{81}{4}+0+1+1+16\right]$

$$= \frac{1}{18}\times\frac{250}{4} = \frac{125}{36} = 3.4722$$

Therefore, Spearman's rank correlation coefficient r_R *is*

$$r_R = \frac{\frac{n^2-1}{12} - \frac{Tu+Tv}{2} - \frac{1}{2n}\sum_i d_i^2}{\sqrt{\frac{n^2-1}{12} - Tu}\sqrt{\frac{n^2-1}{12} - Tv}}$$

$$= \frac{6\cdot6667 - \frac{1}{2}(0\cdot2778 + 0\cdot3333) - 3\cdot4722}{\sqrt{6\cdot6667 - 0\cdot2778}\sqrt{6\cdot6667 - 0\cdot3333}}$$

$$= \frac{2\cdot88895}{\sqrt{40\cdot46346}} = 0\cdot45$$

(I) Linear Regression Analysis : Suppose y is a variable and it is Regressed on another variable x so regression means, dependency of y on x. One of the problem of a bivariate analysis is even if the value of a independent variable in known it becomes difficult to assertain the value of the dependent variable y. But this problem can be easily solved if y can be expressed as a mathematical function of x. Let $y = f(x)$; then this equation can be said as the Regression equation of y on x. When in the most simplest situation x is linearly related with y the it can be expressed as per the following;

$y = a + bx$

According to this relation $a + bx_o$ is the determined value of y when $x = x_0$

(J) Derivation of Linear Regression Equation :

Suppose a Linear Regression Analysis is $y = a + bx$ ...(i)

As based in this equation to assertain the value of x the value of y is to be used therefore on the basis of given values of x and y the constant a and b are to be calculated. Suppose n number of bi-values (x_i, y_i) are given where $i = 1, 2 ..., n$ now to assertain a and b it is advised to follow the Least Square Method amongst other probable methodologies, since this method has not of desirable significances.

when $x = x_1$ then the observed value of y is y_i but Predicted value is $a + bx_i$

Therfore an error occurs while taking the value $a + bx_i$ for y_i this error is demoted as e

$e_i = y_i - (a + bx_i)$ this is knows as error of estimation.

In Least Square Method a and b is predicted in such a way so that in respect of . a and b, $\sum_i e_i^2 = \sum (y_i - a - bx_i)^2$ becomes the lowest. To predict a and b following are the equations.

$$\frac{\partial}{\partial a}\left(\sum_i e_i^2\right) = 0 \text{ and } \frac{\partial}{\partial b}\left(\sum_i e_i^2\right) = 0$$

These two equations give $\sum_i (y_i - a - bx_i) = 0$

or $\sum_i y_i = na + b\sum x_i$ ...(ii)

and $\sum_i (y_i - a - bx_i)x_i = 0$

or $\sum_i x_i y_i = a\sum_i x_i + b\sum_i x_i^2$ ... (iii)

This equations are called normal equation. If equation (iii) is multiplied by n and (ii) is multiplied by $\sum_i x_i$ and if the latter product and substracted from the former, we have

$$n\sum_i x_i y_i - \left(\sum_i x_i\right)\left(\sum_i y_i\right) = b\left[n\sum_i x_i^2 - \left(\sum_i x_i\right)^2\right]$$

$$\therefore b = \frac{n\sum_i x_i y_i - \left(\sum_i x_i\right)\left(\sum_i y_i\right)}{n\sum_i x_i^2 - \left(\sum_i x_i\right)^2}$$

$$= \frac{\frac{1}{n}\sum_i x_i y_i - \bar{x}\,\bar{y}}{\frac{1}{n}\sum_i x_i^2 - \bar{x}^2} = \frac{\text{covariance } (x, y)}{\text{variance } (x)} = r\frac{\sigma_y}{\sigma_x}$$

$\because b = r\frac{\sigma_y}{\sigma_x}$.

The following is obtained from equation (ii)

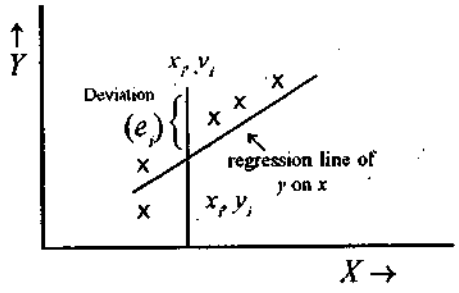
$\bar{y} = a + b\bar{x}$

or $a = \bar{y} - r\frac{\sigma_y}{\sigma_x}\bar{x}$

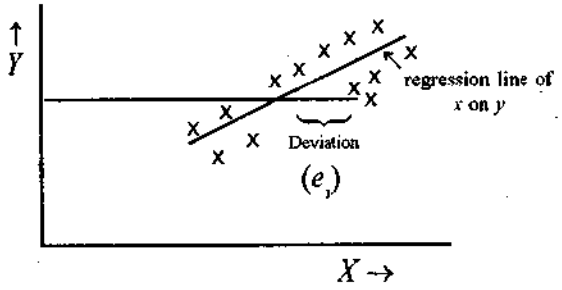
On putting the estimated values of a and b in (i), we obtain the regression equation of y on x as

$$y = \bar{y} + r\frac{\sigma_y}{\sigma_x}(x - \bar{x}) \qquad \text{...(iv)}$$

$\because b_{yx} = r\frac{\sigma_y}{\sigma_x}$ where b_{yx} is called the regression coefficient of y on x and it measures the change of y for unit change is x.



Pic No. 3.1 (a)



Pic No. 3.1 (b)

In the scatter diagram 3.1 (a) the regression time of y on x is shown as error. Similarly through least square method another regression line can be obtained this shows the regression of y which is used to predict the value of x on the basis of the value of y. The following relation may be considered to obtain this line.

$$x = c + dy \qquad \text{...(v)}$$

where $c + dy_i$ is the predicted value of x when $y = y_i$, therefore to estimate c and d the sum of squares of deviations of x from $c + dy$ requires to be minimised.

i.e. $\sum_i (x_i - c - dy_i)^2 = \sum_i e_i^2$ is taken as the minimum in respect to c and d.

In a similar manner the regression of x on y can be obtained from the following occassion.

$$x = \bar{x} + r\frac{\sigma_x}{\sigma_y}(y - \bar{y}) \qquad \text{...(vi)}$$

where $b_{xy} = r\frac{\sigma_x}{\sigma_y}$ is the regression coefficient of x on y

In 3.1 (b) diagram the equation (vi) has been shown as the geometric representation of the regression line of x on y.

Comment : (1) The two regression line $(\bar{x}, \bar{y})$ intersects each other because it is seen in both equation (iv and vi) $x = \bar{x}$ and $y = \bar{y}$ complements each other.

(2) The two regression lines are seperate because they have been generated on different conditions. Although the two lines coincide when $r = \pm 1$ i.e. when the relation between the two variables are exactly linear.

(K) Some Important Results :

(1) For the sake of making the calculation easier the centre point / origin and measuring scale both can be changed. The origin of two variable x and y are shifted (a,b) and the scale in changed to c, d.

When $u=\frac{x-a}{c}$ and $v=\frac{y-b}{d}$ then $b_{xy}=\frac{d}{c}b_{uv}$ and $b_{xy}=\frac{c}{d}b_{vr}$

proof : $x=a+cu$ and $y=b+dv$

$\therefore x-\bar{x}=c(u-\bar{u})$ and $y-\bar{y}=d(v-\bar{v})$

Therefore variance $(x) = c^2$ variance (u) and variance $(y) = d^2$ variance (v) and co variance $(x, y) = cd$ covariance (u, v)

$$\therefore b_{xy}=\frac{\text{covariance }(x,y)}{\text{variance }(n)}=\frac{cd\,\text{covariance }(u,v)}{c^2\,\text{variance }(u)}=\frac{d}{c}b_{uv}$$

Similarly $b_{xy}=\frac{c}{d}b_{uv}$

(2) From the regression equation of y on x, we see that when $x = x_i$, the predicted value of y is $y = y_i$. In the scatter diagram 3.1 (a), the points (x_i, y_i), and (x_i, y_i) are shown.

Let, $Y_i=\bar{y}+r\frac{\sigma_y}{\sigma_x}(x_i-\bar{x})$

$$\therefore \sum_i Y_i=n\bar{y}+r\frac{\sigma_y}{\sigma_x}\sum_i (x_i-\bar{x}) \quad [\because \Sigma(x_i-\bar{x})=0]$$

$$\bar{Y}=\frac{1}{n}\sum_i Y=\bar{y}$$

On the assumption that the arithmetic means of y_i and Y_i are same, we have $\bar{e}=0$

$$\bar{e}=\frac{1}{n}\sum_i e_i=\frac{1}{n}\sum_i (y_i-Y)=\bar{y}-\bar{Y}=0$$

Similar results will hold for x as well

For $(\bar{e}=0)$ the following results will also hold :

(1) Variance $(Y) = \frac{1}{n}\sum_i (Y_i-\bar{Y})^2=\frac{1}{n}\sum_i \left[\bar{y}+r\frac{\sigma_y}{\sigma_x}(x_i-\bar{x})-\bar{y}\right]^2 \quad (\because \bar{Y}=\bar{y})$

$$= r^2 \frac{\sigma_y^2}{\sigma_x^2} \cdot \frac{1}{n} \sum_i (x_i - \bar{x})^2 = r^2 \frac{\sigma_y^2}{\sigma_x^2} \cdot \sigma_x^2 = r^2 \sigma_y^2$$

$$\therefore r^2 = \frac{\text{variance } (y)}{\text{variance } (y)} = \frac{\sigma_y^2}{\sigma_y^2}$$

or $|r| = \frac{\sigma_y}{\sigma_y}$

If the regression of y on x is linear, *a* measure of the dependence of y on x is given by | r |, which is shown to be equal to the ratio of standard deviation of Y_i the predicted value to that of y_i the observed value.

Similary, for the equation of x on y we have $|r| = \frac{\sigma_X}{\sigma_X}$

r^2 is called the coefficient of determination and can be used as a measure of efficency of the linear regression equation. It gives the percentage of total variability explained by the regression equation.

(2) The quality $\sigma_y^2(1-r^2)$ is called the residual variance of y, given $X = x$

variance $(e) = \frac{1}{n} \sum_i e_i^2$ where $e = 0$

$$= \frac{1}{n} \sum_i (y_i - Y)^2 = \frac{1}{n} \sum_i \left\{ (y_i - \bar{Y}) - r \frac{\sigma_y}{\sigma_x} (x_i - \bar{x} \right\}^2$$

$$= \frac{1}{n} \sum_i (y_i - \bar{Y})^2 - 2r \frac{\sigma_y}{\sigma_x} \frac{1}{n} \sum_i (y_i - \bar{y})(x_i - \bar{x}) + r^2 \frac{\sigma_y^2}{\sigma_x^2} \frac{1}{n} \sum_i (x_i - \bar{x})^2$$

$$= \sigma_y^2 - 2r \frac{\sigma_y}{\sigma_x} r . \sigma_x \sigma_y + r^2 \frac{\sigma_y^2}{\sigma_x^2} . \sigma_x^2 = \sigma_y^2 - 2r^2 \sigma_y^2 + r^2 \sigma_y^2$$

$$= \sigma_y^2 (1 - r^2)$$

where variance $(e) \geq 0$ there $\sigma_y^2(1-r^2) \geq 0$, or $1 - r^2 \geq 0$.

or $r^2 \leq 1$

or $-1 \leq r \leq +1$ as proved before

(3) covariance (x, e) $= \frac{1}{n}\sum_i (x_i - \bar{x}).e_i$ where $\bar{e} = 0$

$$= \frac{1}{n}\left(\sum_i x_i e_i - x\sum_i e_i\right)$$

$$= \frac{1}{n}(0 - \bar{x}.0) = 0$$

$\therefore\ r_{xe} = 0$

Therefore, e can be treated as a part of y which is uncorrelated with x

(M) **Some results relating to Regression Line & Co-efficient :**

(1) Two regression lines are :

$$Y = \bar{y} + r\frac{\sigma_y}{\sigma_x}(x - \bar{x}) \qquad \text{...(i)}$$

and $$X = \bar{x} + r\frac{\sigma_x}{\sigma_y}(y - \bar{y}) \qquad \text{...(ii)}$$

(i) Gradient is $r\frac{\sigma_y}{\sigma_x} = m_1$ (say) and (ii) Gradient is $r\frac{\sigma_x}{\sigma_y} = m_2$ (say) If the acute angle between the regression lines is θ, then $(\bar{x}, \bar{y})$

$$\theta = \tan^{-1}\left|\frac{m_2 - m_1}{1 + m_1 m_2}\right| = \tan^{-1}\left|\frac{\frac{\sigma_y}{r\sigma_x} - r\frac{\sigma_y}{\sigma_x}}{1 + \frac{\sigma_y}{r\sigma_x}.\frac{\sigma_y}{r\sigma_x}}\right|$$

$$= \tan^{-1}\left|\frac{1 - r^2}{r}.\frac{\sigma_x\sigma_y}{\sigma_x^2 + \sigma_y^2}\right|$$

and the other angle is $\pi - \theta$

If $r = \pm 1$, then $\tan\theta = 0$ i.e $\theta = 0$ so that the lines coincide. On the contrary, if $r = 0$, then $\cot\theta = 0$ i.e. $\theta = \frac{\pi}{2}$ so that the lines become prependicular to each other interseting at $(\bar{x}, \bar{y})$.

(2) The regression coefficients are :

$b_{yx} = r\frac{\sigma_y}{\sigma_x}$ and $b_{xy} = r\frac{\sigma_x}{\sigma_y}$

$$\therefore b_{yx}.b_{xy} = r\frac{\sigma_y}{\sigma_x}.r\frac{\sigma_x}{\sigma_y} = r^2$$

$$\therefore |r| = \sqrt{b_{yx}.b_{xy}}$$

Therefore, the absolute value of r is the geometric mean of the regression coefficients, and r will have the common sign of the regression coefficeints.

(3) Since the arithematic mean of positive quantities is greater than or equal to their geometric means, we have

$$\frac{|b_{yx}|+|b_{xy}|}{2} \geq \sqrt{|b_{yx}|.|b_{xy}|}$$

$$= \sqrt{b_{yx}.b_{xy}} \quad \text{(where } b_{yx}, b_{xy} \text{ are of the same sign)}$$

$$= \sqrt{r^2} = |r|$$

Therefore, r cannot be larger than the arithematic mean of the absolute values of the regression coefficients.

Example 1 : From the following data, obtain the regression equation of x on y. Also predict x when $y = 6$.

$$\sum x = 24 \qquad \sum y = 44 \qquad \sum xy = 306$$

$$\sum x^2 = 164 \qquad \sum y^2 = 574 \qquad n = 4$$

Solve : The regression equation of x on y is :

$$x - \bar{x} = b_{xy}(y - \bar{y}) \text{ there } b_{xy} = \frac{\text{covariance } (x,y)}{\text{variance } (y)}$$

$$\bar{x} = \frac{\sum x}{n} = \frac{24}{6} = 6, \quad \bar{y} = \frac{\sum y}{n} = \frac{44}{4} = 11$$

$$\text{covariance } (x, y) = \frac{306}{4} - \frac{24}{4}.\frac{44}{4} = 10{\cdot}5$$

$$\text{variance } (y) = \sigma_y^2 = \frac{574}{4} - \left(\frac{44}{4}\right)^2 = 22{\cdot}5$$

$$b_{xy} = \frac{10{\cdot}5}{22{\cdot}5} = 0{\cdot}467$$

$\therefore$ The required regression equation is : $x - 6 = 0{\cdot}467(4 - 11)$

or $x = 0{\cdot}467y + 0{\cdot}86$

$y = 6$ is $x = 0{\cdot}467 \times 6 + 0{\cdot}86 = 3{\cdot}7$

Example 2 : If $4u = 2x + 7$ and $6v = 2y - 15$ and the regression coefficient of y on x is 3 then obtain the regression coefficient of v on u.

Solve : $u=\frac{1}{2}x+\frac{7}{4}$ and $v=\frac{1}{3}y-\frac{5}{2}$

$\therefore u-\bar{u}=\frac{1}{2}(x-\bar{x})$ and $v-\bar{v}=\frac{1}{3}(y-\bar{y})$

variance $(u)=\left(\frac{1}{2}\right)^2$ variance $(x)=\frac{1}{4}$ variance (x)

and covariance $(u,v)=\frac{1}{2}\cdot\frac{1}{3}$ covariance (x, y)

$$\therefore \quad b_{uv}=\frac{\text{variance}(u,v)}{\text{variance}(u)}=\frac{\frac{1}{2}\cdot\frac{1}{3}\text{ variance }(x,y)}{\frac{1}{4}\text{ variance }(x)}=\frac{2}{3}b_{yx}=\frac{2}{3}.3=2$$

Exercise

1. Calculate the correlation coefficient from the following data :

X	:	6	2	10	4	8
Y	:	9	11	5	8	7

[Ans. +0.98]

2. The values assumed by the vairables X and Y are as follows :

X	:	–3	–1	+1	+3
Y	:	9	1	1	9

Show that r_{xy} = 0. Are the independent. If not, then explain the reason for r_{xy} = 0. [Hints :- x and y are nonlinear and $y = x^2$. r_{xy} measures linear relationship.]

3. Obtain (i) the correlation coefficient, (ii) regression equation of x on y from the following data :-

$\sum x=56$, $\sum y=40$, $\sum x^2=524$, $\sum y^2=256$, $\sum xy=364$, n = 8

[Ans. +0·98, x = 1·5y –0·5]

4. Show that correlation coefficient is the geometric mean of the regression coefficients.

5. In a competition, 7 students had been ranked by two judges as follows :

Student	:	A	B	C	D	E	F	G
rank of the 1st judge	:	2	1	4	5	3	7	6
rank of the 2nd judge	:	3	4	2	5	1	6	7

Calcultate the rank correlation coefficient [Ans. r_R = 0·64]

6. If $r_{xy} = 0{\cdot}06$ and $\sigma_x = 1{\cdot}50$, $\sigma_y = 2{\cdot}00$, $\bar{x} = 10$, $\bar{y} = 20$, then obtain the regression equations of Y on X and of X on Y.

[Ans. $y = 0{\cdot}8x + 12; x = 0{\cdot}45y + 1$]

7. If the two regresson lines are $y = 5{\cdot}6 + 1{\cdot}2x$ and $x = 12{\cdot}5 + 0{\cdot}6y$. respectively, the obtain the means of x and y and their correlation coefficeint.

[Ans. 56·64, 73·57 + 0·85]

8. If the regression lines are $x + 2y = 5$ and $2x + 3y = 8$ $\sigma_x^2 = 12\bar{x}$, obtain $\bar{x}$, $\bar{y}$, σ_y and r. [Ans. $\bar{x} = 1, \bar{y} = 2, \sigma_y = 2, r = \frac{-\sqrt{3}}{2}$]

2.4 Determination of sample from Population

Sampling means to select a portion from the entire subject which helps to study and understand the correct information. The total statistical dataset about all the units or characteristics of a group of individuals is known as population or universe. The portion of this population which is selected to determine its characteristics is called sample.

The characteristics of a group of individual requires to be analysed for statistical investigation. This kind of group of sector which is under investigation is called population. The unit or members of the population may be workers of an industry, apples of a basket, or the cultivating lands in a locality etc. Most of the time due to the limitation of time and labour it is not practically possible to analyse or judge the entire population or even if the units of the population it quite voluminous then also it becomes practically impossible to analyse the whole population.

Investigation with adequate sample is called sample survey. In case of complete enumeration or complete census each units of the entire population is investigated. Generally sample survey is more preferred. Some of the reasons for this may be highlight.

1. Reduction of cost.
2. Greater speed.
3. Greater accuracy.
4. Measure of accuracy
5. Greater applicability

Therefore partial investigation is more acceptable and wide by used in compared to complete investigation. The decission obtained from the investigation is considered to be equally applicable to the whole population. This kind of decission making methodology

about the whole population is called Sampling method.

If the number of units of a population is limited then it is called Finite population or universe. On the other side if the number of units of a population is infinite then it is called infinite population or universe. For example the population of houses in a locality is a finite populations. But the population of atmospheric pressure in different places of a house in infinite.

Population may be existent or hypothetical. If there is any real existance of the units of population then it is said to be an existent population. Otherwise it is said to be an hypothetical population.

Sampling is generally divided into two classes. Subjective and objective. In case of subjective sampling it depends upon the judgement and wish of the sampler. But incase of objective sampling the units are selected on the basis of some special rule. Therefore objective sampling is virtually independent of the sampler.

Sampling is again divided into three category. Dependent, Indipendent and Mixed. When there the sampling is done without any preconcieved possibility but done. Only by following certain rules then it is called Non-Probalistic sampling. When there is a chance of selecting all the units of a population for sampling their it is called Random sampling or probalistic sampling. Partial Non-Probalistic and partial probalistic sampling is known as Mixed sampling.

2.5 Sampling Methods

There are various sampling methods. Some important methods may be discussed. These are : 1. Simple Random Sampling Method. 2. Purposive Sampling Method. 3. Stratified sampling method. 4. Systematic sampling method. 5. Multi stage sampling method.

All these methods have been discussed in details in the first unit, therefore they are not repeated here.

Exercise

1. What are the different methods of sampling? How sampling is done from a population?

2.6 Test of Hypothesis

Lot of day to day problem of the population requires decisssion which are taken on

the statistical sample survey done by the statisticians. For example, if there is a co-predictive sample is given then it is to be seen that whether it a normal distribution with an Arithmatic Mean = 40, Standard Deviation = 3 this has to be determined. To draw an inference on such issues it requires to have some assumption and anticipation about the characteristics of the population, specially the probable frequency or the parameter value has to be assumed. This type of assumption or any statement about the population is called statistical hypothesis. The process through which the assumption is assertian to be true or false that is called Test of Hypothesis or Test of Significance.

(A) **Statistical Inference :** The main objective of sample analysis is to test a portion of the population and then draw inference about the whole population. This kind of dicisions are known as statistical inference. The statistical scale of the population (such as Arithematic Mean of population, population variance etc.) or calculation of parameter and Testing the assumptions of the Parameters these are the two main branches of statistical inference. Therefore to have an idea or assumption about the parameters or the characteristics or structure of the whole population is called statistical assumption. These assumptions may be simple or composite.

(B) **Some Useful Concepts :**

1. *Simple Hypothesis* : The statistical hypothesis which entirely explains the population is known as simple hypothesis.

2. *Composite Hypothesis* : The statistical hypothesis which does not entirely explain the population (i.e., parameters are unknown) is called composite hypothesis.

3. *Test of hypothesis or Test of significance* : There are series of deciplined process through which decission is taken whether the hypothesis will be accepted or rejected. This process is called test of hypothesis or test of significance.

4. *Null hypothesis* : This is such a statistical hypothesis where the efficiency of the hypothesis is tested for rejection on the basis of sample observation. Generally the Null hypothesis is represented by Ho and the alternative ???.

5. *Alternative hypothesis* : This is a hypothesis which differs from null hypothesis and it is usually represented by H_1. Alternative hypothesis are not tested but the decision of accepting (or, rejecting) of the hypothesis virtually depends upon the acceptance or rejection of the null hypothesis. The opposite of null hypothesis is alternative hypothesis. The selection of perfect (exact) critical region effectively depends upon the type of alternative hypothesis.

6. *Test Statistics* : It is a scale or statistics for observing the sample which helps to take the final decision. Whether to accept or reject Ho. The selection of test statistics has to be done with enough precaution and during the time of formulating the decision

rules one has to have a fair idea on frequency distribution. If the value of test statistical falls within the critical region then the non-effective hypothesis are rejected.

7. *Critical region* : Critical region means a set of test statistical which shows the way to reject the null hypothesis. The probability of rejecting a null hypothesis oftenly determines the size of critical region. A sample which is geometrically represented with n shape ($x_1, x_2 \ldots x_n$) is expressed by a point (x) this is called sample point, and the place or the plane where all probable sample points are gathered is known as sample space (w). Therefore critical region can be defined as a subset of sample space, for which the null hypothesis is rejected.

(8) *Level of Significance* : The highest probability on the basis of which a null hypothesis (Ho) is rejected that is called level of significance and it is represented by d. At the time of writing the rules of the inference the level of significance is arbitrarily set depending upon the significance of inference. As per the norms the level of significance is set between 5% or 1%. Through the other levels like 2% or $^1/_2$% is also used. To indicate the highest level of volume of critical region the significane level is taken as d (for type 1 error)

(9) *Error of first Type* : When the null hypothesis is rejected through testing, the error that occurs due to this is called Error of first type. The critical regin is set in such a manner that the error of first type does not supercide the level of significance.

(10) *Error of second Type* : When the ineffective hypthesis is accepted on the basis of testing then it is called Error of second type. The possibility of error of second type virtually depends upon the values of alternative hypothesis (H_1) and it is used to evaluate the efficiency of the test.

Power of the Test : The possibility of rejecting a false null hypothesis is called power of the test. Therefore 'power' is the process to draw conclusion of a null hypothesis when it is false.

A constant value in the parameter which is correlated to the alternative hypothesis (H_1) the power = 1. – Error of second type. In the context of every alternative if the power is shown by a graph diagram then the line which is obtained is called power curve.

Steps in test of Hypothesis or significance :

1. The first step is to determine the null hypothesis and the alternative hypothesis. The H_0 and H_1 is determined on the control of given problem. Generally the null hypothesis is related to the corresponding parameter value of a population. $H_0 = (\theta \neq \theta_0)$ where θ is a parameter and θ_0 is the hypothetical value of the parameter. Now the alternative hypothesis can be any of the following;

$H_1(\theta \neq \theta_0)$, $H_1(\theta > \theta_0)$, $H_1(\theta < \theta_0)$ whether this will effectively be an one Tail Test. or Two-Tail Test is determined by the alternative hypothesis.

2. The next step is test statistics, T, and in the context that the null hypothesis is true, mention the sample distribution of T. In a large sample test; $z = \frac{(T - \theta_0)}{S.E(T)}$ which follows the standard normal distribution. But in case of small sample test the population is considered to be normal, and the different test statistics are used which are actually follows the normal standard deviation, chi-sqaure, t distribution or F distribution.

3. The next step is to determine the level of significance a of a test. If that is not mentioned in the porblem. This is the highest probability of committing Error of first type i.e., to draw an wrong inference through a test when the null hypothesis is actually true. Generally 5% or 1% level is used as level of significance. When nothing is mentioned about this their it is advisable to consider 5% as level.

4. The next step is to determine the critical region. A set or cluster of values of test statistics are expresed through this which gives dicision is favour of rejecting the null hypothesis. Critical region always appears either is the phases of one side or in both sides of the distribution which depend upon the uniderection or bidirection of the alternative hypothesis. The area in the two tails of a distribution, which is known as the area of volume of critical region that should obviously be equal to the level of significance d. For a one tail test a is expressed in one end of the distribution and for a two tail test $\alpha/2$ is expressed in all the ends of the distribution the critical region is :

$T \geq T_{\frac{\alpha}{2}}$ or $T \leq T_{1-\frac{\alpha}{2}}$ when $H_1(\theta \neq \theta_0)$

$T \geq t_\alpha$ when $H_1(\theta > \theta_0)$

$T \leq T_{1-\alpha}$ when $H_1(\theta < \theta_0)$

where T_α is such a value of T whose right side are a is α.

(5) The next step is to determine the value of T on the basis of sample data, and Calculate H_0. If there are some parameters unknown while testing the large volume of sample they can be calculate from the sample.

(6) The next step is if the value of test statistics T remains in the critical region then H_0 is to be rejected. Or not to reject H_0. H_0 is rejected only after comparing the calculated value of T and critical value.

(7) Now the conclusion is expressed in a simple manner. If H_0 is rejected then the explanation will be as per following :

The Hypothesis H_0 is true but the data are not correlated therefore H_0 is not acceptable. On the other side if H_0 is not rejected then it is said that the data cant prove everything against H_0 therefore H_0 can be accepted. It is advisable to express the conclusion is words.

Example : In a big city 325 people are smokers out of 600 people. From this data can this be presumed that majority of the persons is that city are smokers?

Solution : The Null hypothesis is that the ratio of smokers in the city is 50% i.e.

$$\frac{50}{100}=0\cdot5 \quad \therefore H_0(P=0\cdot5)$$

Now it is to bejudged the ratio of smoker in the city is greater than 50% whether therefore the alternative hypothesis is : $H_i(P>0\cdot5)$

In the sample the ratio of smoker is 600 = 325 in n observation value

$$(P)=\frac{325}{600}=0\cdot542$$

if H_0 is true then

expected value $(P_0)=0\cdot5$.

and standard Error or $S.E.(P)=\sqrt{\frac{0\cdot51\,(1-0\cdot5)}{600}}=0\cdot0204$

Test Statistics $z=\frac{\text{observation value}-\text{expected value}}{0\cdot0204}=2\cdot1$

A the alternative hypothesis, $H_i(P>0\cdot5)$ is unidirectional, therefore the critical region of test area is one ended.

At 5% level of significance the critical region is $z\geq1\cdot645$ It may be mentioned that for r z ends of the Standard normal line is 5% and that is $\geq1\cdot645$.

The value of test statistics z is 2·1. Since it is within the critical region and therefore it is significant. Due to this the null hypothesis H_0 is rejected at 5% level of significance and an inference can be drawn that majority of the people of the city are smokers which is supported by data.

(D) **Chi-Square (x^2) Distribution :** Chi Square test (x^2 test) is one of the widely used and simplest teste of statistical activity. In the year 1900 Karl Pearson first conducted this test. x^2 virtually explains the magnitude of diffenciation between theory and observation. It can be defined as per the following :

Chi-Square = $x^2 = \Sigma \frac{(f_o - f_e)^2}{f_e}$

Where f_o and f_e are respective statistics on the basis of observation—observed frequency and expected frequency. x^2 is used in two ways. A confusion may arise due to this. In the sphere of descriptive statistics x^2 represents the limit of correlation between too variables. On the other side the correlation which is probability based is expressed by x^2 in the field of statistical inference. This is extensively used in case of those variables whose attributes are expressed by the measuring numbers.

When a variable χ is considered with normal distributions whose arithematic mean (μ_i) and variance is σ_i^n i.e. $\chi \sim N(\mu i, \sigma^2)$ then $z = \frac{(\chi - \mu)}{\sigma}$ is a standard normal vairable i.e., $Z \sim N(0,1)$ The statistical theory shows that a standard normal variable can be distributed properly whose degree of freedom (= *d. f.*) is 1

Equationally

$\chi^2(1) = z^2$ where (1) is the *d.f.* or χ^2.

The parameter of standard normal distribution is the arithematic mean or variation similarly the parameter of χ^2 distribution is *d.f.*

A probable variable χ will be considered virtually similar to χ^2 distributions if the probable distribution function—— (*P.d.f.*) is

$$f(x) = K.e^{-\frac{x}{2}}.x^{(n/2)-1}; (0 < x < \infty)$$

Where K is constant, *n* is *d.f.* The variable which follows the chi-square distribution is chi-squate variable.

Characteristics of χ^2 distribution :

(1) Arithematic mean = *n*, standard deviation $= \sqrt{2n}$

where *n* is the *d.f.* of distribution of χ^2

(2) The χ^2 line is positive and differential and it rises from the origin point and goes to infinity in the right side.

(3) If *x* and *y* two variables are chi-square independent whose *d.f.* is n_1 and n_2 respectively, then the sum of two variables $(x+y)$ virtually follows χ^2 distribution whose *d. f.* is $(n_1 + n_2)$

(4) When $d.f. = n$ is high then $\sqrt{2\chi^2} - \sqrt{2n-1}$ follows the standard normal distribution.

χ^2 distribution is effectively used in both sample testing-large and small. Then the values after observation are seen whether they have correlation with the hypothetical distribution which is known as 'Godness of fit' and χ^2 distribution is used to test it. χ^2 is used to justify the independent nature of the attributes. In case of small sample χ^2 distribution is used for standard distribution. χ^2 distribution is mainly used for :

1. To correlate between the observation value and hypothetical value, which is called Goodness of fit test.

2. Test for independence of attributes

3. Test for a specified standard deviation.

The χ^2 test method can be explained with examples.

The following Table shows the relation between height and grade.

Student's hight	Grade of test			
	C	B	A	Total
Tall	30	10	10	50
Medium	10	30	10	50
Short	30	20	50	100
Total	70	60	70	200

The number in the cells of the above table gives the observed frequency f_0

The calculation of the expected frequency is shown in the following table.

Expected frequency (f_e) = (row total) x (Column total ÷ grand total)

Height of Students	Research Process grade			Total
	C	B	A	
Tall	17·5	15	17·5	50
Medium	17·5	15	17·5	50
Short	30	20	50	100
Total	70	60	70	200

For example, the expected frequency corresponding to the height 'Tall' and grade 'c' is (70 x 50) ÷ 200 = 17·5) These are indicated by f_e.

The following table shows the difference of observed and expected frequencies f_0 and f_e.

(for example, for 'tall' and 'c' grade the difference is 30 – 17·5 = 12·5)

Height of Students	Grade of Tests			Total
	C	B	A	
Tall	12·5	–5	–7·5	0
Medium	–7·5	15	–7·5	0
Short	–5	–10	15	0
Total	0	0	0	0

$\therefore \chi^2$ = Sum of squares of every difference ÷ expected value of concerned cell.

$$= \sum \frac{f_0 - f_1}{f_1}$$

(example : In case of taller students is C grade $(12{\cdot}5)^2 \div 17{\cdot}5 = 156{\cdot}25 \div 17{\cdot}5 - 8{\cdot}93$)

$\therefore \chi^2$ = 1st group $(8{\cdot}93 + 1{\cdot}67 + 3{\cdot}21) +$

2nd group $(3{\cdot}21 + 15 + 3{\cdot}21) +$

3rd group $(0{\cdot}71 + 3{\cdot}33 + 6{\cdot}43) = 45{\cdot}7$.

Since χ^2 is not zero that is why data are not independent. But the direction of association can not be understood from the value of χ^2. In inferencial statistics for evaluation the association on requires to have χ^2 Table or cmputer programme.

This association may occur all of a sudden without going into indepth analysis of χ^2 it may occur less than 1 time out of 1000 occassion. In a I cell table χ^2 = 45·7 is considered to be significant at ·0001 level.

The parameter is degree of freedom of *d. f.* in a χ^2 distribution. *d.f.* actually indicates the number of observations in case of sum of the squares. In the above case *d.f.* is 1 since there is only one square of a normal standard distributions mentioned.

Similarly suppose $z_1, z_2 \ldots z_K$ are the unit of K number of normal independent variable that means for every z the normal random variable whose arithematic mean is zero and variance = 1. Now, if every squares of z is taken then this can be shown that the sum of this squares will express of χ^2 distribution whose *d.f.* will be K

$\sum z^2 = z_1^2 + x_2^2 + ... + z_K^2 \sim \chi^2(K)$

Example 1 : A die is tassed 60 times and the results are given below. The die is unbiased—does the following data correlates with this assumption where $\chi^2_{.01} = 15{\cdot}09$ *d.f.* (for 5)

Face	:	1	2	3	4	5	6	Total
Frequency (f_0)	:	6	10	8	13	11	12	60

H_0 is the dies which is unbiased :

$\therefore$ The probability of each face $\frac{1}{6}$ since the die has 6 faces.

Expected frequency $(= f_e) = 60 \times \frac{1}{6} = 10$ (every time)

$\therefore$ f_0	:	6	10	8	13	11	12
f_1	:	10	10	10	10	10	10
$(f_0 - f_1)^2$	:	16	0	4	9	1	4

$$\therefore \chi^2 = \frac{16}{10} + \frac{0}{10} + \frac{4}{10} + \frac{9}{10} + \frac{1}{10} + \frac{4}{10} = 3{\cdot}4$$

Here there is 6 classes $\therefore d.f. = 6 - 1 = 5$

Since the observative value of χ is 3.4 which is lower than the given value of χ^2 $(\chi^2_{.01} = 15{\cdot}09 d.f.$ for 5) therefore H_0 can not be rejected at 1% significance leve.

comment : It is established that the die is unbiased which is supported by the data.

Exercise

1. What do you mean statistical hypothesis? How many types of hypothesis is there and explain them with examples.

2. Explain : i) Statistics, ii) Parameter, iii) Level of Significance iv) First and Second level error.

3. Discuss the different steps of Hypothesis is Analysis.

4. Discuss in brief about Test Statistics and χ^2 distribution.

5. Suppose a sample of 10 is taken from a population. The sum difference of squares from the Arithematic mean of the sample is 50.

6. A coin is tossed 5 times to test its perfectness. The perfectness the null hypothesis is rejected if the coin appears with its head 4 times. In this condition what is the probability of first level error. If the chance of appearnce of head = 0·2 then calculate the second level error.

7. Following are the data set distribution of 320 families who have 5 children each.

Number of Boys	:	5	4	3	2	1	0
Number of Girls	:	0	1	2	3	4	5
Number of Family	:	14	56	110	88	40	12

Example whether the give data are consistent with the hypothesis that boys and girls have the same probabiliyt of being born.

(Give that the value of χ^2 with *d.f.* 5% level of significance is 11·07)

[Ans. The probability is equal to the decission taken]

Reference Books :

1. Spiegel M. R. : Theory and Problems of Probability and Statistics (Schaum's outline series) : Mc Graw Hill Book Co.
2. Goon A. M., Gupta M. K. & Das Gupta B. : An Outline of Statistical Theory, Vol. I & II (The World Press Pvt. Ltd.)
3. P. K. Giri & J. Banerjee : Statistical Tools and Techniques
4. Das N. G. : Statistical Methods Vol. I & II
5. Ghosh and Saha : Business Mathematics and Statistics
6. Nag N. K. : Business Mathematics

Unit 3 ❐ Use of Computer in Social Work Research

Structure

3.1. What is Computer

Present age is known as computer age. It is a machine which fulfils many objective perfectly. Therefore it is called computing machine. The word 'Computer Means Common Purpose Users Terminal' which mean the place where the users go for common purpose. This machine can do different types of job in day to day requirement of man, and its presence and usage is increasing day by day in every sphere of human life. With the help of this machine three basis job are done in a rapid speed, and without any error.

- (i) Data Collection (ii) Data Analysis (iii) Data Storage. the usage of computer is recognised in any sphere of research work and in the area of Social Work Research there is no exception.

There is unexpected progress in the field of computer in the last four decades. That is why there is a paradigm shift from Analogue Computer to Digital Computer. Besides this depending from the user requirement Desktop Computer, Laptop Computer and Super Computer has emerged. The Mechanisation has charged into Computerisation. A new subject has emerged in the field of technology which has been named as Information Technolgy. The main pillar of this technology which has been named as Information Technology. The main pillar of this technology is computer. Computer help to transform collected data into information and which can be stored for the future.

It requires to have idea in two areas to learn about computers 1. Different parts of computer which is known as Hardware and 2. Try which the computer is made workable which is termed as Software.

1. Computer Hardware : The component by which the computer is made up are called Hardware. Therefore it is also called processor. This is the main part of computer. The speed of data processing depends upon the power of the processor. At pesent with the help of Large Scale Integration Technology the power of computer has been enhanced

to a great extent.

ii) Main Memory : Data processing largely depends upon the power of the processor but it also depends upon the volume of main memory. Because at the time of processing huge volume of data it requires to have compatible memory. While processing the data exchange is done through memory. Therefore in present time the usage of disk memory has been extended to store data.

iii) Input output unit : The components which are used to enter data into the computer are called input devices. Keyboard, mouse, scanner these are examples of input devise. On the other side the components which helps to get the results from a computer are known as output device. Monitor, Printer, Speaker are the examples of output devices.

2. Software : Although it can count at an unbelievable speed but after all computer is a machine. But this machine is not enough to work on its own. It can only work on giving some commands. This work of giving instruction through commands is done by the Software. Actually the software is a kind of computer programme. The software contains the directions and set of instruction to perform a particular job. Computer carry out those directives at a great pace. Software are of two types, they are;

i) System Software : Operating System is are of an essential system software. A computer can not be operated without operating system. Windows, Linux are examples of such software. Besides these another important system software is Programming Language, Compiler such as C^{++}, Fortran etc. with the help of which one can develop a software.

ii) Application Software. : The software which are used for day to day work are called application software. Such as word processing software MS Word, Word perfect etc. Spread Sheet software like MS Excel, Lotus 123 for accounting purpose. Photo processing software like Adobe Photoshop, Corel Photo, Paint etc.

3.2 Word Processing

The writing work is very much related with Research work. Because anything related to data/Information may require to be written. Earlier this was hand written. After the manufacture of type writer the problems of writing by hand was always there. Such as- it was not possible to have multiple copy of the same matter. If there was any mistake in writing the matter required to be re-typed. After the introduction of electronic type writer these drawbacks were largely removed but as the memory of the electronic type writer was not much there was lot of limitations. Besides that the stylisation of the matter such as using colours, different type and size of type face adding picture creating table was also not possible. These problems literally vanished after the invent of computer.

The facilities which can be availed from the computer for writing work are as follows;

1. One can write correctly and easily.
2. The page setup, page orientation, type face, line etc. can be composed as per the requirement of the subject.
3. Table, picture equation etc. can be inserted as per requirement.
4. The spelling and grammer can be checked.
5. Facility of changing matter.
6. As many number of printouts as required.
7. Facility of storing the Text matter.

The last point (7) is the most important factor because writings are one kind of information/data which needs to be perfectly retrieved at a fast pace on requirement, in future. Naturally computer is the most ideal medium for this job. Composing the text matter in a computer is called word processing. The reasearcher need to have good knowledge in this since it requires to write a lot in a research work. Word processing is such a strong and powerful system that at present it is practically impossible to carry out research work without it. This system is very much effective in case of recording data and using the same as per requirement.

Any write up prepared through word processing programme remains as a file in the computer disk. This file can be opened and edited as and when required. The entire matter can be seen on the monitor while writing through this programme. The size and type face for writing can be done through key board. Besides this the entire page set up is visible on the monitor. This makes writing easier.

Besides written matter, table, picture, etc. as well as some data obtained from another programme can also be kept directly in a file. The page set up and stylization of written matter depends upon the choice of the user.

The word processing programme shows if there is any grammatical error or spelling error while typing and accordingly correction is made. After completion of composing the text matter print out of the same can be taken as many number as required through the printer. Before taking print out the matter can be viewed through Print Preview option and if required changes can be done. The mostly used word processing software is MS Word. Print the other word processing software such as Word Perfect, Word Pro etc. are also used for the same purpose.

3.3 Electronic Spread Sheet

Generally spread sheet is an accounting book which has Row and Column. Different data and accounts are written in the squares made up of row and column. The vertical lines creates the column and horizontal lines creates the row. Spread sheet were used to maintain accounts and recording data before the use of computer. But after the introduction of computer the electronic spread sheet or the spread sheet software has

been introduced. Because the main problem with the general spread sheet was the accounting was to be done manually. This used to take much time and there was possibility of error in addition or subtraction. Therefore it was needed to check the accounts. Besides this most of the time it was not possible to prepare reports from the data of a spread sheet.

The initial job of data processing and analysis can be done through spread sheet for a research work. Collected data can be entered into the spread sheet then many information can be obtain after words. The computer does the job of preparing information from data. Because various statistical methods are available in the software. Electronics spread sheet does not have the limitations of a general spread sheet. In case of a complex computation if a single data is changed then the rest of data are changed within no time and the recalculated result is also visible on the screen. This feature is important as well as very much attractive. This facility can not be imagined in a general spread sheet.

There is enough inbuilt formula in an Electronic spread sheet to make computation easier which can be easily used. The popularity of personal computers was because of usage of word processing software and spread sheet software. At present the spread sheet software is more developed. The inbuilt formulas are not limited only in additon, subtraction, multiplication and division. It is now added with different formulas of Statistics, Higher Mathematics, Trigonometry, Engineering etc. Besides this it provides the facility of chart, report, database table and more over programming, which made it a powerful tool for numerical data base bable and more over programming, which made it a powerful tool for numerical data analysis. Along with accounts and financial work there is extensive use of spread sheet software for engineering design and research analysis work.

Microsoft Excel is such a widely used software. Besides this Lotus 123, Quatro Pro etc. are the spread sheet software which are used in data analysis. But amongst all Excel is most popular Excel is one of the four components of Ms-Office, Others are MS Word, Access and Power Point. The icon of Excel generally resides in the programme menu. The programme is activated by clicking on this icon. The square that forms with the combination of row and column in the spread sheet are called cell. All the cell have address and the cell address is used in case of using various formulas for computation.

Some times preparing the thesis of a research charts and graphs are required. Because it is becomes more easy to understand the characteristics of data of an work sheet if they are represented through times and pictures. Because most of the time it becomes difficult to judge their nature, just by seeing the numbers.

Therefore it needs to have statistical data diagram. Excel provides differents types of charts like Bar chart, Column chart, Line chart, Pie-chart, XY chart, Surface chart etc. Beside these Excel allows to draw three dimensional charts. Generally the chart wizards are used to generate charts. In the Menu Bar there is an Insert opiton, clicking on Insert,

the chart sub option poses up, clicking on the chart option the chart wizard button appears on the tool bar, the operator has to processed further by clicking on this wizard. The chart wizard window appears it has four steps to follow for creating a chart.

From the above discussion it can be said that to analyse the collected data with speed and accuracy for the sake of Social Work research the researcher has to have a fairly good amount of knowledge and skill on MS-Excel to easily cary out the research work. Besides this it facilitiates by saving time for creating different types of graph, charts etc.

3.4 Database Management

In a research work different types of data are collected from different sources. These data are the main basis of reseacrh. Because the information which are obtained by analysing the data, finally they give the ultimate inference of the research. Earlier the researcher had to do every thing on his own right from data collection to analysis. This used to be time consuming, laborious and expensive and chances of error was quite high. After the introduction of computer, most of these job are done by the computers with great speed and accuracy, this helps a lot to the researcher. However the to do this the researcher has to have the knowledge of computer operation.

Data base is an organised and scientific method to store any kind of data in a computer. Data can be retrieve with great speed and accuracy from the data base of a computer here it differs from the other database systems the data which are collected for research, most of the time they are interrelated. Therefore it needs to take decision by analysing them together. For this there should be an arrangement so that the data can be centrally accessed. If the data are not centrally kept then there are two major problems. These are - same data have to be re-entered at different stages of the work, all the data are not available altogether at any point of time. If data are stored separately in isolated places then it makes unnecessary wastage of time, increases the volume of stored data and also increases the chances of error. At the time of creating a data base, one should have a clear conception on to aspects. They are :

(i) **Table :** One or more table can remain in a table rather a database may have one or more table. Different data for research work are kept in different table of a database. The data base consists of all the tables.

(ii) **Field and Record :** There are many number of rows and column in each table. Each row is called record and each column is called field. Each record consists of related data for which the table has been created. On the other side the data items are kept in columns.

Actually all the data are centrally stored in a database. Hence a single data are entered only once. Since the data are interrelated therefore data can be accessed from any where of the data base. Beside this if data is changed at one place, it reflects on the other places

of the database. But if the data are stored centrally then importance must be given to some other aspects. There are the security and confidentiality of data as well as the quality and purity of data.

Data base Management System :

A special programme is required to create and use data base. This programme is called Data Base Management System or DBMS. The main job of DBMS are –

i) Creating useful table
ii) Arrangement of data entry into a table
iii) Arrangement of editing data
iv) Set Relation between tables
v) Retrieve useful information at a faster speed
vi) Arranging the data base in such manner so that it can be use by many users at a time and
vii) Security of data.

The major facility of DBMS is the user can easily Enter, Edit data and get useful information. For this the user to not require to know how to create, design a databse or how the data are interrelated in a data base. In fact DBMS is not a data base itself it is a software. It is used to relevant data base for a specific job. Like Excel is used to create a spread sheet, MS-word is used for writing. DBMS are generally two types - Desk top DBMS and Client/Server DBMS. Microsoft Access is a desktop DBMS and oracle and Microsoft SQL Server is a client/server DBMS. client/ server DBMS is used where the data volume is large and data security is important. Desktop DBMS is very much useful in case of Social Work Research.

Characteristics of DBMS(Significance) : The qualitative significance of DBMS depends upon the following;

i) **Data :** The type of data that are stored in all sorts of data base are - whole number, Fraction number, Alphabet or text, Date and Logical data (True/False). Few DBMS supports Picture and Multimedia data.

ii) **General Data Analysis :** More or less all the DBMS provides the basic methodologics of data analysis, like, sorting which means arranging in lower to higher or higher to lower order.

Searching - To reach as specific data, filering - To assemble them in or place etc. These are general commands. These process are visible on screen therefore these are very useful for the users.

iii) **Data Communication Language :** The language which are used to extract, analyse and present relevant data from the database is called DMC. DMC is a kind of query language. Now-a-days almost all the DBMS provide SQL (Structured Query Language)

iv) **Programming Language :** In some of the DBMS, besides Query Language, there

are object oriented languages to prepare application programmes to have control over the database at record level.

v) **File Structure :** All the data are kept in a file through a special process so that later they can be retrieved very fast from the data base. Every DBMS have their own method for doing this. But most of the DBMS software run with an arrangement called open Data base connectively ODBC for exchanging data from other DBMS.

Relational Data base :

Relational data base is a combination of tables. It is a process of joining more than one table by relating them and then retrieve data. Generally at the time of data base creation, data are distributed in different tables in such a manner so that same data do not have to be re-entered. These tables needs to join to get a complete information. To join two such table, both of them has to have a common field which is called Key Field. The process of joining a table with another is relationship. Since there are specific relationship between the tables of a data base, this kind of data base are known as Relational Data base.

The software which is used to create relational data base is called Relational Data base Management System (RDBMS). All the present DBMS software are basically RDBMS - like Oracle, Microsoft SQL, Informise, Microsoft Access etc.