Reproduction: -

Reproduction is the process of formation of new young individuals by the grown up individuals that look very much like them.

It is one of the most important and fundamental properties of living organisms by which every kind of living organism multiples to form new individuals of its own kind. Thus, reproduction is meant for the continuation of the species. Reproduction, thus, creates new life and is essential for the perpetuation of species. It gives rise to new organisms with the same basic characteristics as their parents. It plays an important role in evolution by transmitting favorable variations from one generation to another.

Significance of Reproduction:-

1. **Continuation of Life.** Reproduction is essential for continuation of life on earth. In its absence life will be wiped out of earth within span of some years.
2. **Perpetuation of Species.** Reproduction carries the genetic characteristics of the parents into the new individuals. This perpetuates a species.
3. **Replacement.** It is a means of replacing individuals killed due to ageing, disease or predation.
4. **Population Characteristics.** It maintains the composition of population of infants, young, adults and aged.
5. **Variations.** It introduces new variations.
6. **Transfer of Variations.** Useful and neutral variations are transferred to the progeny through reproduction. There variations help the individuals in the struggle for existence and adaptability to changed environmental conditions.

Basic features of Reproduction: (i) Replication of DNA. (ii) Growth and differentiation of cellular machinery. (iii) Cell division. It is mode of reproduction in single celled organisms. (iv) Continued replication of DNA, growth and cell division, formation of tissues, organs, etc. and maturation of multicellular organisms. (v) Development of special reproductive structures and formation of new individuals

Variations:- Variations are differences found in morphological, physiological and other traits of individuals belonging to the same organisms, race or family. They develop due to (i) Faulty DNA replication (ii) Crossing over (iii) Chance separation of chromosomes during meiosis and chance combination during fertilization.

Importance of Variations:- They are highly important. There importance can be put as below:

a) **Pre-adaptation:-** Variation function as pre-adaptations to environmental changes like increase or decrease in temperature, drought, antibiotic resistance, pesticide resistances. Normally each

population is adapted to live, feed and prosper in a particular niche or ecological space of operation. Reproduction normally maintains the body design, features and functions suitable to that particular niche. However, environmental changes do occur. They result in change of niches. Change in a niche is liable to wipe out the population using that niche. However, variations present in some individuals n the population may enable those individuals to survive, multiply and later form the population equal to previous one.

b) **Individuality.** Variations provide individuality to each living organism. It is because of variations that we recognize on e another.

c) **Struggle for Existence.** Suitable variation provides an edge to certain individuals in the struggle for existence.

d) **Improvement of Varieties.** Variations help breeders to improve varieties of plants and animals.

e) **Evolution.** Variations are raw materials for evolution or formation of new species

Types of reproduction: -

The process of reproduction may be broadly grouped into two categories.

A) Asexual reproduction: -

The development of new individual with out the fusion of male and female gamete is known as asexual reproduction. It usually includes the division of nucleus and the cytoplasm and hence is known as somatogenic Reproduction. In asexual reproduction, new individuals are identical to the parents. It represents a rapid mode of multiplication. It can occur in the following ways.

i) Binary fission: - In this process an organism divides into two equal parts, which on separation live independently. During this process the nucleus of the parent cell divides mitotically into two equal parts which is followed by the division of the cytoplasm resulting in the formation of the two identical cells referred to as daughter cells. Binary fission occurs under favorable environmental conditions. e.g. amoeba. Paramecium and euglena multiplies by binary fission.

ii) **Multiple fission:** - In this process an organism is covered externally by a wall called cyst, which protects it from unfavorable conditions. Then the nucleus divides many times to give rise to the formation of many small nuclei. When favorable condition arrive, the cyst is broken down and a large number of small organisms come out which are capable of living at their own. E.g. amoeba, malarial parasite and plasmodium etc. It is also known as Schizogamy or sporogamy.

iii) **Budding**: - In this form of asexual reproduction, the concerned organism gives an out growth called as bud, which grows to form a new individual. The developing individual its food from the

parent and when it becomes fully mature, it gets detached from the body of the parent to live an independent life. E.g. Hydra multiplies by budding.

iv) **Fragmentation:** - In this process of asexual reproduction an individual breaks up into several parts called fragments. And each fragment develops into a new individual. Natural fragmentation occurs in algae. Some flat worms and ringworm's etc. It may also be induced by internal forces e.g. hydra.

v) **Plasmotomy:** - It is the division of a mulinucleate protozoan into several small, mulinucleate daughters without nuclear division (Karyokonesis) the daughters grow and regain the normal number of nucleus by nuclear division. It takes place in opalina and Pelomyxa.

vi) **Spore formation:** - In this process a resting cell gets protected by a thick coat that prevents the cell from the unfavorable conditions like high temperature, drought, high acidity etc. On return of the favorable conditions, the thick walls breaks open and a germinating spore comes out which grows and reproduces in the usual fashion e.g. spores of bacteria like clostridium and bacillus etc.

vii) **Vegetative reproduction:** -When a part of the plant – stem, root or leaf gets detached and develops into an independent individual, the process is referred to as vegetative propagation as explained under.

a) **Vegetative propagation by roots**: - In some plants like sweet potato, dahlia, adventitious roots become thick and sworn due to the shortage of food. These bear adventitious buds, which develop many leafy shoots called as slips. When such roots bearing adventitious buds are planted in the soil they produce new plants.

b) **Vegetative propagation by stem:** - In some plants, the stems can efficiently give rise to new plants, e.g. in mint or chrysanthemum, sub aerial stems develop as lateral branches from the parent plant which gets transferred into new plants. Similarly, in some plants, under ground stems become modified as store houses of food materials and gives rise to aerial shoots which get developed into new plants. E.g. rhizome of banana, tuber of potato and corn of saffron etc.

c) **Vegetative propagation by leaves:** - In some plants like bryophyllum, the fleshy bear adventitious buds their notches located on the margins when these leaves fall on a moist soil favored by favorable condition of temperature and humidity, these buds develop into small plants. Which are capable of living independently.

Other methods of vegetative propagation

1. **Cutting:** - It is the most common method of the vegetative propagation. In this method a piece of stem having few nodes and internodes is taken from the parent plant and planted in the moist soil. After some time roots immerge from its basal portion and the buds give rise to the shoots, which results in the formation of a new plant. The plants of rose, sugarcane, banana, orange, and bougainvillea are commonly grown by this method.

2. **Layering:** - Layering means development of roots on a stem, which is attached to the parent plant. The stem that develops adventitious roots while still attached to the parent plant is a layer. Layering is a natural process, but can be induced by bending a plant branch and covering its middle portion below the soil. However, the apical portion of the branch is kept exposed to the air. After some time the portion of the branch below the soil develops adventitious roots and can be transferred into an individual plant if planted in a moist soil under favorable conditions. This process is commonly practiced in Magnolia, Jasmanium, rose e
3. **Grafting:** - In this process of vegetative propagation, a detached twig having several buds is planted or inserted into the stem or root of another plant to grow an individual plant of the same kind. When the detached twig is referred to as scion and the plant portion into which the twig is inserted is referred to as stock. In order to avoid infection, the point of grafting is covered with grafting wax.
4. **Tissue culture:** - It is a modern method of vegetative propagation in which a small tissue is taken from a plant and is allowed to grow in a medium containing all the essential nutrients required for the proper growth of the plant. When the tissue grows it forms an undifferentiated mass of cells called "Callus" which is used for further multiplication. The callus is then chemically induced to form platelets, which are transferred into pots or soil and raised to maturity.

Advantages of vegetative propagation: -

The main advantages of vegetative propagation are listed below:

1. It is a cheap and easy method of reproducing the plants.
2. The plants that do not produce viable seeds are easily propagated by this method.
3. It is the only method of producing and preserving two plant types during cross-pollination.
4. This method is used to produce a large number of selected strains of plants without loosing any desirable character.
5 It helps in the dispersal of offspring to the far and distant places.

viii) Regeneration:- It is the ability to form missing parts. Regeneration is helpful in multiplication of some animals like Hydra and Planaria (Dugesia) if they are broken or cut into pieces. Each piece grows the missing parts and forms the complete organism. The ability to regenerate in complete organism. The ability to regenerate in differentiated organisms is due to presence of special reserve or stem cells. The reserve cells first proliferate and form a large number of cells. Cells then undergo differentiation giving rise to various cell types and tissues. The process of regeneration is highly organized and is similar to development as found during growth of an individual from a young one.

B) **Sexual reproduction: -** In this process, development of new individuals takes place by the fusion of sex cells of male and female gametes either from different individuals or from different organs of the same individual. The individual that produces male gametes or sperms is called as male and the individual, which produces gamete, or ovum is called female. During sexual reproduction a gamete from male fuses with the gamete from female. This process is called fertilization and results in a single cell called zygote. The zygote develops into a new organism. It is most common in multicellular organisms.

i) **Sexual reproduction in plants**: - A flower is the reproductive part of plant. It consists of four sets of floral organs. Sepals, petals, stamen and carpel. The stamen constitutes the male part of the flower. A flower bears a certain number of stamens collectively known as androecium. Each stamen consists of three parts – anther, connective and filament. The anther bear four chambers of pollen sacs, each filled with pollen grains. The pollen when ripe is released from within the anther through a narrow slit and produces male gametes or spores. A flower also bears one or more carpels collectively known as Gynaccium or pistil. Each carpel consists of three parts- slightly swollen and sticky stigma at the top, then a cylinder stalk called style and basal swollen ovary, which bears ovules containing egg cells or eggs.

On the maturation of the flower, the stigma becomes receptive to the pollen grains. A pollen grain after being deposited on the stigma produces a long pollen tube, which grows down through the stigma and style and enters one of the ovule in the ovary. Then the sperm fuses with an egg and zygote is formed by their fusion. This process of fusion of male and female nuclei is called fertilization. After fertilization the ovule develop into seed and the whole ovary becomes a fruit. The mature fruit contains one or many seeds each with an embryo inside which gives rise to a young plant of the next generation.

Pollination: - The process of transfer of the pollen grain from the anther of a stamen to the ovary of the carpel of the flower is referred to as pollination. Pollen grains are carried by the wind, water insects and other animals up to the stigma of a pistil. It is of two main types viz.

1. **Self-pollination:(Auto gamy)** - This process involves the transfer of pollen from the anther of a stamen to the ovary of the carpel of the same flower. It is the characteristic property of the bisexual flowers.

2. **Cross-pollination: - (Xenogamy)** This process involves the transfer of the pollen grains from the anther of the stamen to the ovary of the carpel of the other flower wither on the same plant or a different one. It is a characteristic property of unisexual flower. Cross pollination occurs with the help of two main groups of agents –biotic and abiotic. The former include living beings such as insects and birds, while the latter include wind and water. Flowers and pollen grains are accordingly modified to

facilitate the process of cross-pollination. Insects –pollinated plants have flowers that are brightly coloured and produce necter to attract insects. Wind pollinated plants have flowers that produce a large number of pollen grains, which are very light. These are easily carried by the wind over long distances.

ii) **Sexual reproduction in animals: -** In animals, various processes perform the sexual reproduction. In some unicellular organisms the fusion of morphologically identical gametes takes place, e.g. monocysts. While some others produce two types of gametes, the male gamete which is motile and small in size (micro gamete) and the female gamete which is passive and comparatively larger in size (macrogametes). The union of such micro and macrogametes is referred to as anisogamy or herogamy e.g. higher animals and plants as referred to, in these animals the fusion of male and female gametes occur and the process being referred to as fertilization. In lower vertebrates like fish and amphibians etc. it generally occurs outside the body of the female (external fertilization). Such animals lay eggs and are called oviparous. In some animals and man it occurs within the body of the female (internal fertilization). Such animals give birth to young ones and are called as viviparous.

Fundamentally, the process of fertilization results into the restoration of the diploid number of chromosomes determination of the sex of the new organism and activation of the zygote to start a series of mitotic divisions called as cleavage. The zygote when grows into an embryo gives rise to the young organism of the next generation.

Fertilization: - Fertilization is the process, which results in the fusion of the sperm with an ovum to form a single diploid cell called zygote. It can occur in the following two ways:

1. **External fertilization: -** It is a characteristic property of primitive organisms and is an adaptation of aquatic animals. In this process the process of the fusion of male and female gamete takes place outside of the female in an external medium like water.
2. **Internal fertilization:** - It is the characteristic property of primitive organisms and is an adaptation of aquatic animals. In this process the process of the fusion of male and female gamete takes place outside the body of the female in an external medium like water.

Male Reproductive System:

The male reproductive system is a complex system, which develops, and functions under the influence of

hormones. The reproductive organs become functional only after attaining sexual maturity, which is attained at the age of 13 –14 years in males. The male reproductive system consists of a pair of testes, ducts, accessory gland and penis.

1**. Testes**: -In man and most other animals, the testes are two oval bodies suspended in a sac hanging from the lower wall of the abdomen – the scrotum. Apparently human sperms cannot develop at a higher temperature found within the body cavity. Hence the testes are suspended outside the body.

Each testis is composed of 200 – 300 coiled seminiferous tubules lined with epithelial cells that produce sperms. These are also lined with interstitial cells of leydig, which produces the male sex hormone called testosterone. It promotes development of accessory glands and controls secondary male sex character along with the formation of spermatozoa.

2. **Epididymis:**- Epididymis is made up of a compact mass of small-coiled tubules forming a convoluted tubule of 6 cm in length. It lays along side the testes in the scrotal sac. Testes and Epididymis together constitute testicle. Epididymus stores the sperms. Filters them and makes them motile by the time they reach to its posterior part connected with the Vasdeferens. Chemicals produced by the lining of the tube are essential for maturation of the sperm

3. **Vasdeferens: -**It is the muscular tube about 40 cms long that leaves the scrotum by the inguinal canal and emerges with a duct from the bladder into the urethra. The terminal position of each Vasdeferens enlarges to form a duct capable of contraction and expulsion of the stored sperms. A glandular seminal vesicle empties into each ejaculatory duct before it connects the urethra. This secretes a viscous fluid, which is expelled along with the sperm. The mixture of this fluid and sperm is known as semen. In the Vasdeffernis the sperms are inactive but as soon as they mix wit this secretion they become quite active.

4. **Prostate Glands: -** These are paired glands lying below the bladder around the junction of ejaculatory duct of two sides with the urethra. These discharge its secretion directly into the urethra, which as alkaline in nature and contributes 15 – 30% of the total volume of the semen. The Prostate Gland also secrets mucus which is released during ejaculation and helps to neutralize the acidity of the vagina, making the sperm more active.

5. **Cowper's Gland: -** These paired glands are also attached to the urethra about 5cm below the prostate gland. They secrete an alkaline substance, which serves as a lubricant for the semen. The secretions of both these glands suspend the sperms, motile and nourish them and neutralize the acidic environment of the urethra.

6. **Penis: -** The penis is the external male genital organ. It is composed of three columns of spongy tissues. The corpora cavernosa surrounding the urethra and a layer of skin on the outside. The tip of the

penis enlarges to form the glands, which is normally covered by a fold of skin – the prepuce. The penis contains erectile tissue. When the male is sexually excited, this tissue fills with blood, causing the penis to become erect. During sexual intercourse, the erected penis is inserted into the vagina of the female to deposit the semen in the genital tract of the female during orgasm.

7. **Seminal Vesicles:-** It can be seen at the base of the urinary bladder. They secrete mucus and a watery alkaline fluid that contains nutrients, including the sugar fructose, which is an energy source for the sperm. Each seminal vesicle empties its contents into the ejaculatory duct, adding to the volume of the semen.

Female Reproductive System:

The female reproductive system consists of a pair of oviduct (Fallopian tube) uterus and the vagina.

1. **Ovaries: -** The human ovaries are two small almonds like flattened bodies lying on the sides of the vertebral column behind the kidney's in the pelvic cavity. Ovaries produce female gamete ova and the female sex hormones such as Oestrogen and progesterone. These hormones cause a number of changes. The ovary releases one ovum every 28 days.

2. **Oviduct (Fallopian tube): -**Close to each ovary is an expanded funnel shaped oviduct. Both oviducts are narrow tubes opening into the uterus. Its walls are lined with cilia, which sweeps the ovum towards the uterus. The oviduct is about 10-15 cms long. It curves outwards towards the sides of the abdomen. It is wider towards the sides but very towards the uterus. An ovum is produced and released alternatively from the two ovaries after every four weeks and it makes take three days travelling down the oviduct to the uterus. If sperms are present, fertilization takes place in the upper end of the fallopian tubes. If the ovum is not fertilized, it is discharged during the next menstrual flow.

3. **Uterus: -** It is a large, thick walled, pear shaped muscular organ. It is connected to its either sides to the fallopian tubes. The upper portion of the uterus is secular, then lays the body and then the lower constricted portion called cervix. The body of the uterus has three coverings, the inner most endomatrium, the middle myomatrium and the outermost perimatrium. The endomatrium is glandular containing blood vessels and uterine glands. The middle layer or myomatrium is muscular having several layers of smooth muscle fibres. The upper perimatrium has cerous membrane and a thin

connective tissue. The cervix acts as a splinter muscle the close the uterine lumen and prevents the foreign particles from entering into the uterus.

4.Vagina: - It is large muscular tube of 7-10 cms long that runs from the uterus to the out side. Vagina receives sperms from the male organ, penis. It also serves as a birth canal during the birth of the child. The external genital parts of the female include the outer lips (Labia majora) and the inner lips (Labia Minora) and the clitoris.

Menstruation:- if there is no occasion for the released ovum to be fertilized then the ovum is passed out. It will never be implanted in the uterus in the unfertilized state. After about 2 weeks of ovulation, in the event of egg not being fertilized, the uterus begins to contract. This is a sign of undoing the preparations it had made to receive the fertilized egg. Upon the contraction of uterus, the blood capillaries rupture and the blood flows out through the vagina. This process is called menstruation. The blood along with tissue debris is called Menses. Menstruation lasts for 3-4 days. Afterwards, the uterus starts preparing itself afresh for the arrival of the ovum in the next 2 weeks. To sum up, menstruation takes place 14 days after the ovulation. Again 14 days after menstruation, there is fresh ovulation. In this way, ovulation and menstruation alternate. Both these processes stop once pregnancy has set in. when the girls attain the age of 13-15, she begins to ovulate. This is the age of her sexual maturity and the first menstruation in the life of a girl is called Menarche. The menstruation stops in a woman in the late forties and the ending of menstruation is called Menopause.

Contraception:- It is possible to into limit the size of family through various means. It requires the use of methods which prevent the fertilization of ova. Fertilization of the egg and its implation is referred to as conception or pregnancy. Prevention of conceptions called contraception. There are several ways by which conception can be prevented.

Contraception Methods:-

These methods involve prevention of fertilization and conception result in birth control and is the basis of family planning. Contraception may be natural or mechanical.

a) **Natural Methods of contraception:-** If copulation is avoided for a few days, i.e. at ± 3 days of the first day of ovulation which likely to be the time period when the ovum is available in the uterus, fertilization can be avoided. This is called rhythm method of contraception.

Another natural method of contraception is coitus interrupts . in this method require extreme self-discipline and self-control.

b) **Mechanical methods of contraception:-** In this approach, various mechanical method are used to prevent the passage of semen to the fallopian tube or to prevent implantation.

Condoms or nirodh. It is a thin rubber tube worn the peins before sexual intercourse. The ejaculate gets collected in this tube and is not discharge in to vagina.

Diaphragm or cervical cap. It is a large thin rubber hemisphere fixed on a flexible metal ring. It is fitted the cervix in a woman's body by a doctor to prevent the entrance *of sperms into the cervical canal.*

Intra uterine device (IUD) or loop. It is a very effective method to avoid conception. IUD or loop is made of plastic or stainless steel. It is inserted in the uterus. Its insertion causes certain secretion which prevents the implication of embryo in the uterine wall.

c) Chemical methods of contraception

Spermicides. IN this method, strong spermicidal (sperm-killing) creams, jellies, etc are injected in the vagina before copulation, which kill the sperms and avoid fertilization.

Oral contraception or pills. Oral contraception prevent ovulation in females. These pills should be taken daily. Birth control pills contain synthetic hormones resembling oestrogen and progesterone which prevent ovulation but allow monthly shedding of the uterine lining through menstrual bleeding.

d) Surgical methods The testes are situated in the scortum. From each testis arises a tube called vas deferens which carries with it the sperms produced by the testits to the urethra. if this tube is tied by a thread, the sperms will not be able to go past the tied point this can be exposed by a slight incision at the base of the scortom. This incision and subsequent ligature (tying by thread) of the vas deferens by a surgeon is called vasectomy. In a vasectomized person, sperms are produce but these do not come in the seminal vesicle when such a person ejaculates, his semen does not contain sperms.

In women, ligature of the fallopian tube can be done (tubectomy) to prevent passage of ova down the fallopian tube.

Sexually transmitted diseases. Diseases spread through sexual contact are called sexually transmitted diseases (STD).

Some sexually transmitted deseases

1. Acquired immuno deficiency syndrome(AIDS) 2. Syphilis 3. Gonorroea
4. Herpes 5. Genital warts 6. Chlamydia

Acquired immuno deficiency syndrome (AIDS)

Acquired immuno deficiency syndrome commonly known as AIDS is probably the most notorious disease in humans. It is sexually transmitted diseases it can pass from one person to another during sexual intercourse. This disease can also be transmitted if blood from an infected person comes in contact with that of a healthy person through a cut, or a scratch or by means of blood transfusion.

AIDS is a pandemic disease, I.e. it is found world over. The word 'immuno deficiency' means that the immune system of the affected person becomes deficient or weak. It is cell-mediated disorder of the immune system.

Causative organism the pathogen which AIDS is the human immunodeficiency virus (HIV)

The human immunodeficiency virus (HIV) is too small naked eyes. Once the virus enters the body it and grows in the body fluid and blood cell of the infected person.

Mode of transmission HIV may be transmitted in many ways.

i) Sexual contact with the affected person through semen or vaginal fluid or through blood in case there is any tearing of tissues during the intercourse.

ii) Exposure to infected blood and blood products by using the same syringe already used by an infected person, and by use of infected blood during blood transfusion.

iii) Organ transplant from an affected person to a healthy person.

iv) During artificial insemination, the semen used may contain HIV infection

v) During pregnancy, from an infected mother's blood to her baby's blood.

Incubation period:- The average incubation period of HIV virus is about 28 months (range 15-57 months).

Symptoms:- A person infected with AIDS may show one or all of the following symptoms:

i) The person feels fatigued or tired, suffers from loss of weight and fever, and sweats profusely.

ii) Persistent dry cough, oral rash and shortness of breath may be observed.

iii) Headache, visual disturbance, vomiting and fits are also witnessed.

iv) Gastro-intestinal problems like mild diarrohea may occur.

v) Skin blotches, eczema, fungal infection and sometimes skin cancer may be observed.

vi) A type of lung disease known as pneumocystic carnie pneumonia develops. Severe immune deficiency leads the pathogen (protozoa) to multiply in lungs and fills them with pneumocysts.

vii) Cancer or tumor of blood vessels known as Kaposi's sarcoma may be seen.

viii) Nervous system any b e affected, the brain may be badly damaged leading to a loss of memory, ability to speak and to think.

A completely infected AIDS patient may die within three years of infection.

Prevention and control:- Although there is no cure for AIDS, the HIV infection can be prevented by taking certain precautions.

i) *Responsible sexual behaviour*

- Avoiding multiple sex partners
- Using a condom or other barrier method of contraception which prevents direct contact between body fluids of two persons.
- Avoiding prostitution and homosexuality

ii) *Screening of blood before transfusion*

- Treatment of all blood and other products use din transfusion to destroy the HIV

iii) *Avoiding sharing of needles*

- By use of disposable syringes and needles.

iv) *Avoiding pregnancy if the mother is HIV positive*

v) *Education people*

- Having knowledge of the ways by which AIDS can be spread and the precautions that should be taken to avoid HIV infection.

Syphilis:-

Causative organism: Trponema pallidum, long corkscrew bacteria.

Models of spread: Sexual contact with the infected person can cause the disease. Infants can contract this disease during birth.

Incubation period: Symptoms of the disease occur in about 10-90 days after contraction, but generally notice in 3-4 weeks.

Symptoms:- Syphilis symptoms occur in stages. These can appear anywhere from 10-90 days after contraction. The common symptoms are given below.

i) Fever and sores appear on the skin, in the throat and urinogenital areas especially vagina or penis, anus, rectum and mouth. Sores are firm, round and often painless, and can lead to other serious diseases as well.

ii) Break out of rashes on hands, feet and palms in seen.

iii) White patches are observed in the mouth.

iv) Acne-like warts are found in the groin area.

v) Hairfall occurs in patches from infected areas.

Prevention and cure:-

- Having sexual intimacy with only one person
- Avoiding prostitution and homosexuality
- Taking appropriate medical treatment.

Gonorrhoea:

Gonorrhoea is a sexually transmitted disease that often involves urethra, vagina or penis, cervix, anus, throat, joint and eyes as its target sites. A large number of gonorrhoea cases are reported each year.

If gonorrhoea is at an advance stage, the symptoms include-abdominal pain and bleeding between menstrual periods. These symptoms are more common in females and are usually more pronounced than in males. They can appear anytime from 2-10 days after contration all the way up to one month after contraction.

Modes of spread: As with most sexually transmitted diseases, having multiple sex partners increases your risk of contracting it. Any kind of unprotected sex is always a risk. Any kind of contact of sores with an infected person is also risk. Besides these ways, infants can contract the disease during birth.

Symptoms:

- Inflammation of mucous membrane in the urinogenital tract.
- Burning sensation while passing out urine
- Rectal discomfort
- Pain in the joints
- Rashes on palms
- Mild sore throat
- In females, it may cause sterility

Prevention and cure:

- Having sexual contact with only one person
- Avoiding prostitution and homosexuality
- Taking antibiotics, such as penicillin infection or appropriate medicines at the appropriate time.

Differentiate Between

Binary Fission	Multiple Fission
1. *Products.* It gives rise to two individuals. 2. *Condition*. Binary fission occurs under favourable conditions. 3. *Nucleus.* Nucleus of the parent cell divides only once to form two	1. It forms several (more than two) individuals. 2. Multiple fission occurs under favourable and unfavourable conditions. 3. Nucleus of the parent undergoes repeated divisions to form a number of daughter nuclei.

daughters. 4. *Cytoplasm* Cytoplasm undergoes cleavage after each nuclear division. 5. *Residue*. No part of the parent body is left unused. *Example*: *Amoeba, Paramecium*	4. Cytoplasm does not divide after every nuclear division. 5. A part of the body, covering and residual cytoplasm is left behind. *Examples:- Plasmodium Amoeba (encysted).*
Unicellular Organisms	**Multicellular Organisms**
1. Reproductive cell. The same cell which functions as the body of the organism also gets transformed into reproductive cell. 2. Technique. Technique of reproduction are simple 3. Asexual Reproduction. It generally occours through fission 4. Sex Organs. No special sex cell or sex organ is present. 5. Sexual Reproduction. It occurs through isogamy to heterogamy	Specific cells take part in reproduction. Techniques of reproduction are commonly complex. It occurs by several methods like fragmentation, regeneration, budding, spore formation, vegetative reproduction, etc. They are present. It is commonly oogamous.

External Fertilization	**Internal Fertilization**
1. Place. Fertilization occurs outside the body of the female. 2. Release of Gametes. Both the sexes discharge their gametes outside their body. 3. Surety. It is not a sure method. 4. Embryo. Embryo develops	Fertilization occurs inside the body of the female. Only the male discharges the gametes and also in the reproduction tract of the female. The female retains its gametes. It is sure method of fertilization. Embryo is generally well protected but may

unprotected, outside the body of the female.	develop outside or inside the body of the female.

Asexual Reproduction	Sexual Reproduction
1. Parents. Asexual reproduction is uniparental i.e., involves a single parent.	Sexual reproduction is generally biparental, i.e., involves to parents of different sexes.
2. Gametes. Gametes are not formed.	Gametes are always formed.
3. Divisions. All the division s are mitotic.	Meiosis occur once. All other divisions are mitotic.
4. Fertilization. Fertilization is absent.	Fertilization or fusion of gametes takes place.
5. Multiplication. It is rapid method of multiplication.	It is comparatively slower method of multiplication.
6. New Individuals. They are genetically similar to the parents.	New individuals are genetically different from either of the two parents
7. Variations. Variations are very few.	Abundant variations occur during sexual reproduction.
8. Evolution. It has little evolutionary importance.	By producing variations, sexual reproduction plays an important role in evolution.

Some important terms:-

Hermaphrodite:- An organism in which both the male and female sex organs are present is called hermaphrodite or bi-sexual. Hydra and earthworm are such organism.

Gamete:- Two types of r reproductive cells produced in males and females are called gametes. Female gametes are larger in size than the male gametes but are non- motile. The male gametes are motile.

Puberty:- In humans , reproductive organs become functional only after attaining sexual maturity. This is attained at the age of 13- 14 years. In males, and 10-11 years in females. The age of attaining sexual maturity is called puberty. It leads to development of secondary sexual characters

Placenta:- From the outer most membrane of the embryo, a number of out pushings arise and get inserted into the inner wall of uterus of mother to form placenta. This device draws nutrition from the maternal blood.

Umbilical cord:- It serves a link between the foetal and maternal circulation.

Homeostasis:- One hormone accelerate the function of a particular organ, but the other hormone puts a brake on it. This system of opposing effects leads to a proper control and balance in the working of the organs. When there is too much of acceleration of the effect organ, the later sends a message back to the endocrine gland asking to stop secreting the hormone. This is a kind of feed back information, which serves to bring about a steady state or a stable state. This steady state of body function is called Homeostasis.

Semen: -It is a thick viscous fluid, which is ejaculated at the time of insemination. It contains sperm cells, secretion of seminal vesicles, prostate glands. Cowper's glands and urethral glands. In man the amount of semen discharged per ejaculation varies from 2.5 ml to 3.5 ml containing 200 – 600 millions of sperms and only one is needed for fertilization.

Sperm:- It is a haploid cell in which 4 different parts can be recognized; Head, Neck, Middle piece, Tale. The head contains the haploid nucleus. The neck bears centriole. The middle piece has compact mitochondria. The tale beats in a characteristic manner so as to provide locomotion to the sperm as a whole.