

Salafiu Model School

Pampore

Class

10th

Subject -

Biology

Study Material

Name of the Chapter

Reproduction

Lesson No: 3

How Do Organisms Reproduce

Conceptual Questions

Q.1) What is reproduction and what are its types?

Ans) Reproduction is the process by which living organisms produce young ones of their own kind to continue their existence. Reproduction is one of the characteristic feature of living organisms. Living organisms reproduce by many methods which have been broadly classified into two types:

- i. *Sexual reproduction* ii. *Asexual reproduction.*

i. Sexual reproduction:- It is that type of reproduction in which individuals (young ones) are produced by the fusion of male and female gametes contributed by two parents.

ii. Asexual reproduction:- It is that type of reproduction in which new individuals (young ones) are formed with out the fusion of male and female gametes. In asexual reproduction only one parent is involved in the formation of new individuals.

Q.2) What are the different types of asexual reproduction.

Ans) Asexual reproduction takes place in the following ways.

- i. Fission.
- ii. Budding
- iii. Spore formation.
- iv. Regeneration of Fragmentation.
- v. Vegetative propagation.

i. Fission:- It is the process in which the parent body (cell) divides to form daughter cells which grow as new individuals. The process of fission is most common in unicellular organisms such as bacteria and protozoa. The process of fission is of two main types:

- a. *Binary fission* b. *Multiple fission.*

a. Binary fission:- It is a type of asexual reproduction in which the body of a unicellular organism divides into two daughter cells which grow as new individuals. This type of reproductions is found in Amoeba, paramecium, Euglena, etc.

In some organisms like amoeba, the splitting of the two cells during division can take place in any plane. However, in some organisms like leishmama (which have a whip like structure at one end of the cell) binary fission occurs in a definite orientation in relation to these structures.

b. Multiple fission:- It is a type of asexual reproduction in which the body of a unicellular organism divides into many daughter cells. This type of reproduction is found in plasmodium (a malarial parasite) and in case of Amoeba under unfavorable conditions.

ii. Budding:- In budding a small bulb like outgrowth develops on the body of an organism called bud. The bud develops into a tiny individual and when fully mature detaches from the parent body and becomes a new independent individual. This type of reproduction takes place in coelenterates (hydra), sponges (scypha) and yeasts.

iii. Spore formation :- Spores are the specialized cells capable of growing into a new individual. The spores are formed in a sac like structure called sporangium. The spores are liberated from the sporangium which when fall on a suitable substratum grow into new individuals. Spore formation is most common in algae, bacteria and fungi.

iv. Fragmentation:- In fragmentation the body of an organism divides into two or more fragments and each fragment grows into a new individual. In case of plants, it is found in algae and planaria and in case animals it is found in tapeworm.

v. Vegetative Propagation:- This is the most common type of asexual reproduction in plants. In vegetative propagation new individual plants are formed from the vegetative parts such as stem, branches, roots and leaves of the parent plant.

Q.3) Write two advantages of Vegetative Propagation.

Ans) 1. It helps in the propagation of those plants that have lost the capacity to produce seeds such as banana, orange, rose and jasmine.

2. The plants produced by vegetative reproduction are genetically similar enough to the parent plant to have all its characteristics.

Q.4) What are the different types of vegetative reproduction?

Ans) The various types of vegetative reproduction are:-

i. Grafting:- It involves joining together the parts of two different plants in such a way that they can live as one plant. In this process, the cutting of a superior plant is put on the stem of an inferior quality plant having root system. The plant that contributes its root system is called stock and the plant which contributes its shoot system is called scion. This method is used to produce superior quality of plants which can not be achieved by sexual reproduction. It is common method in mangoes, apples, peaches, etc.

ii. Cutting:- Small (6-10 cm long) pieces of stem are cut and their free ends are cut to form cuttings. These cuttings are placed slightly vertical in the soil. In this way each cutting develops into a complete plant. Examples are jasmine, rose, lavender, etc.

iii. Layering:- In this process one or more shoots of a plant are bent close to the ground and covered with moist soil but the free end of the branch is kept uncovered. After few days roots start to arise from the part of the branch which is covered with soil. This part of the branch with its newly arisen roots is manually detached from the main branch of the parent plant and is planted to grow as a new complete plant. It is common method of vegetative reproduction in ornamental plants like jasmine, rose plants, etc.

iv. Adventitious buds:- The leaves of the plants like Bryophyllum also help in vegetative reproduction. Their leaves bear buds at the notches of their margins. When this leaf falls on the moist ground, each bud develops into a new plant. Thus adventitious buds formed on the margin of leaf develop into a new plant.

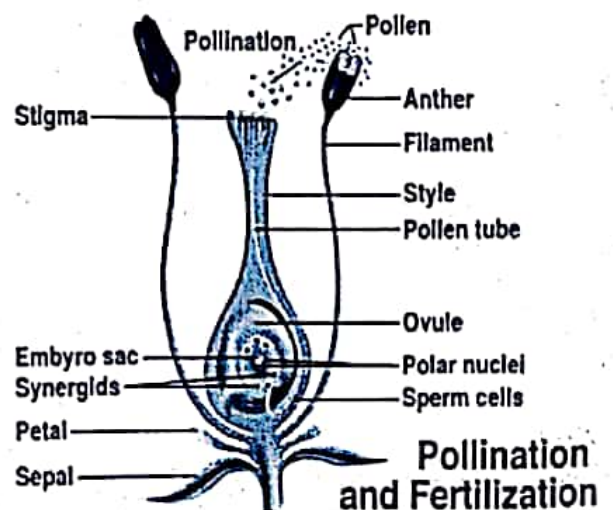
v. Tissue culture:- In this method a small piece of tissue from the vegetative part of the plant is separated and placed in an artificial medium where it divides rapidly into a small group of unorganized cells called callus. The callus is transferred to another medium containing hormones for growth and differentiation to form plantlets. The plantlets are then placed in the soil to develop into mature plants. This technique is commonly used for ornamental plants e.g. asparagus, chrysanthemum, etc.

Q.5 Explain the process of sexual reproduction in plants?

Ans. The sexual reproduction in plants involves three main phases: namely formation of microspores and ovule pollination and fertilization.

(i). Formation of microspores:- The microspores are formed in the microsporangia from microspore mother cells, which are present in Anther. The microspores are formed by the process of meiosis. The partly germinated microspore is called pollen grain.

(ii). Pollination:- The transfer of pollen grains from anther to stigma of the same or another flower is called pollination. The pollen grains are transferred by wind water or insects from anther to stigma. The pollen grain absorbs water on the stigma and divides into two cells namely a vegetative cell and a generative cell. The nucleus of the generative cell divides into two nuclei. The vegetative cell develops into a tube which protrudes through style into ovary containing ovule. The two nuclei or male gametes pass through pollen tube into ovule where one of them fuses with the egg nucleus forming zygote and



another one fuses with secondary nucleus which is diploid. The fusion of one male gamete and egg cell gives rise to formation of embryo while as fusion of another male gamete and secondary nucleus give rise to formation of endosperm which provides nutrition to developing embryo.

Formation of fruit:- The fertilized ovules secrete auxins which cause the ovary to grow into a fruit. The ovary can be made to grow into a fruit with out fertilization by the artificial spray of auxins this process is called parthenocarpy.

Q.6 With the help of diagram describe the structure of male reproductive system in humans.

Ans. The male reproductive system consists of a scrotum, a pair of testes, vasa efferentia, a pair of epididymes, a pair of vasa deferentia, a pair of ejaculatory ducts, urethra and penis.

i) **Scrotum:-** It is a pouch of pigmented skin arising from the lower abdominal wall and hanging between the legs. The testes originate in the abdominal cavity but latter during the seventh month of development descend into the respective scrotal sacs. The scrotum acts as a thermoregulator, maintaing the testes at a temperature 2° lower than that of the body.

ii) **Testis:-** The testes are soft, smooth, pinkish oval organs about 4-5 cm long, 2.5 cm wide and 3cm thick. Testes are formed of seminiferous tubules which consists of spermatogenic cells and sertoli cells. The former becomes sperms while the latter provides nutrient to the sperms. The seminiferous tubules also contain the interstitial or Leybig's cells which secrete the male sex hormone called testosterone.

iii) **Epididymis:-** The epididymis is a long tube attached to the hind surface of the testis. Maturation of sperms and their fertilization capacity occurs in head of the epididymis and are stored in the tail part of Epididymis. The sperms not ejaculated are reabsorbed in the vas deferens.

iv) **Vasa Efferentia:-** The vasa efferentia bear cilia to aid in sperm transport.

v) **Vasa deferentia:-** It is about 40 cm long narrow and tubular structure which starts from epididymis and joins the seminal vesicles to form ejaculatory duct. Vas deferentia conducts the sperms by peristalsis.

vi) **Ejaculatory ducts:-** These are about 2cm long thin walled tubes which open in to the urethra.

vii) **Urethra:-**It is the urinary duct leading from the bladder. It carries urine as well as sperms. It is about 20 cm long.

viii) **Penis:-** Penis is a male couplatory organ through which urethra pass. It is used for depositing semen into the vagina of the female.

Accessory sex glands:- In man there are three types of sex glands namely:

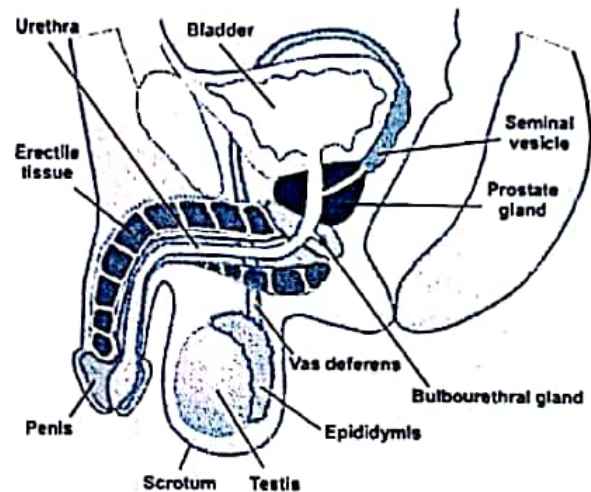
- Seminal vesicles:-** These are a pair of glands present between rectum and urinary bladder.
- Prostate glands:-**It is a single large sized lobulated gland present just blow the urinary bladder.

3. **Cow pars glands:-**These are a pair of white pea sized glands present at the base of penis.

Q.7 With the help of diagram describe the structure of female reproductive system.

Ans. The female reproductive system consists of a pair of ovaries, a pair of fallopian tubes (oviducts) uterus and vagina.

i) **Ovaries:-** The ovaries are the primary sex organs of the female. They are about the size and shape of an almond. Each ovary is connected by ovarian ligament to the uterus. The ovaries remain attached to the body wall by ligament. The ovaries produce female gamete ova and female sex hormones Estrogen and progesterone. The ovaries are externally lined by germinal epithelium. Ovaries are two in number and each ovary produces eggs alternately.



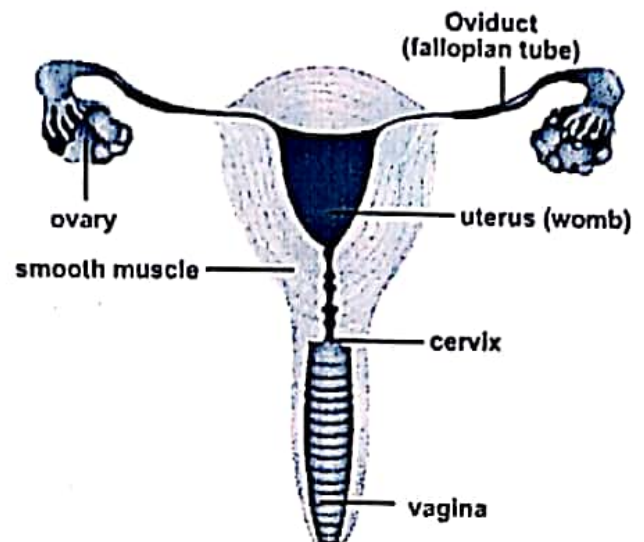
ii) **Fallopian tubes:-** These are a pair of elongated, ciliated muscular and tubular structures extending from just close to ovaries to uterus. The outer part of each fallopian tube laying close to ovary has a wide aperture called ostium and a number of finger like processes called fimbriae to receive the ovum released from ovary.

Functions of Fallopian Tube:- Fallopian tube is the site of fertilization also called fertilization canal. It conducts the Zygote towards uterus by its ciliary action.

iii) **Uterus:-** It is a muscular pear shaped structure present between urinary bladder and rectum. Its internal linings is highly glandular and vascular and is called endometrium. Its lower and narrow part is called cervix which opens into vagina.

Function:- It is the site of foetal development.

iv) **Vagina:-** It is about 7.5cm long and is adopted for receiving penis, allowing menstrual flow and serves as the birth canal.



Q.8 Write short note on: (a) Gametogenesis (b) Spermatogenesis (c) Spermiogenesis

Ans:-

(a) **Gametogenesis:-** It is the formation of haploid gametes from diploid cells of germinal epithelium (the outer most covering of gonads) i.e. testes and ovaries. The gametes in males are called sperms and in females are called eggs. The formation of sperms is called spermatogenesis and the formation of eggs or (ova) is called Oogenesis.

(b) **Spermatogenesis:-** It is the formation of sperms from the germinal epithelium present in the testes.

(c) **Spermiogenesis:-** The formation of motile sperms from non-motile spermatids is called spermiogenesis. In spermiogenesis the weight of the spermatids is reduced to form active sperms.

Q.9 What is fertilization? What are its various types?

Ans:- Fertilization:- It is the fusion of male and female gametes of all sexually reproducing organisms. Its main idea was enunciated by Leewon Hock in 1683. In this process the penetration of a spermatozoon into ovum activates the egg to start the development, while the fusion of their pronuclei (amphimixis) results in restoring the diploid (2n) chromosome number.

Type of Fertilisation"-

a. **External Fertilization.** b. **Internal Fertilization.**

a. **External fertilization:-** The type of fertilization where gametes fuse outside the body of a parent is known as external fertilization e.g. in fishes and amphibians.

b. **Internal Fertilization:-** The type of fertilization where gametes fuse inside the body of a parent is known as internal fertilization e.g. in mammals, birds and reptiles.

Q.10 What means puberty? What changer occur due to puberty in boys and girls?

Ans:- Puberty:- The age at which the sex hormones or gametes begin to be produced and the boy and girl become sexually mature is called puberty. Boys attain puberty at the age of 13 to 14 years while girls reach puberty at a comparatively lower age of 10 to 12 years.

Changes due to puberty in Boys:-

- (i) Growth of thick hair on the face.
- (ii) Cracking of the voice.
- (iii) Muscle development.
- (iv) Sperm formation and development of sexual desire.

Changes due to puberty in Girls:-

- (a) Growth and development of reproductive organs (Ovaries, Fallopian tube, Uterus, etc.)
- (b) Development of breasts.
- (c) Starting of menstrual cycle.
- (d) The broadening of hips and development of sexual desire.

Q.11 What is pollination? Name its two types. How do they differ from each other?

Ans. The transfer of pollen grains from anther to the stigma of a carpel is called pollination. Pollination is of two types namely self pollination and cross pollination

<i>Self Pollination</i>	<i>Cross Pollination</i>
1. Transfer of pollen grains to the stigma of same flower or another flower on the same plant.	1. Transfer of pollen grains from anther to the stigma of a flower of another similar or different plant is called cross pollination.
2. External pollinating agency is not required.	2. Wind, Water birds and insects are required as pollinating agency.
3. Slight variation occurs in young ones	3. Much more variations occurs in individuals

Q.12 What are the hermaphrodite organisms?

Ans. Those organisms which contain both male and female reproductive organs are called hermaphrodite or bisexual organisms. e.g. earthworm, tapeworm, fasciola etc.

Q.13 What are oviparous organisms?

Ans. Those organisms which lay eggs are called oviparous organisms. e.g. all birds, reptiles and the order monotremata in mammals.

Q. 14 Distinguish between external fertilization and internal fertilization.

Ans.

<i>External fertilization</i>	<i>Internal fertilization</i>
1. Fertilization of egg with the sperm occurs outside the body.	2. Fertilization occurs inside the female reproductive system.
2. Water is a medium for fusion of gametes.	2. Secretions from sex organs helps in the fusion of gametes.
3. Large number of eggs are fertilized with the semen of male	3. Few eggs are fertilized.

Q.15 What are viviparous organisms?

Ans. Those organisms which reproduce by giving birth to their young ones are called viviparous organisms e.g Mammals except order monotremata.

Q.16 What are the salient features of sexual reproduction?

Ans. The salient features of sexual reproduction are:

- (i) It involves two parents mostly but some times uniparental (bisexual organisms fasciola, earthworm etc.
- (ii) Haploid gametes are produced by both male and female by the process of meiosis.
- (iii) The fusion of male and female gametes (sperm and egg) is called fertilization. The male gamete is usually smaller and is known as sperm. The female gamete is a bit larger and is known as egg. The fertilization results in the formation of a zygote which is diploid.
- (iv) The zygote divides repeatedly to form a multicellular organism.

Q.17 What are the Salient Features of Asexual reproduction?

- Ans.**
- i. There is no formation and fusion of gametes.
 - ii. Only one parent is involved in the formation of new individuals.
 - iii. Multiplication of cells is rapid and enormous

Q.18 *Write two advantages of sexual reproduction.*

- i. Sexual reproduction promotes diversity among the offspring because variations from two parents are coming together.
- i. Progeny of sexual reproduction have more chance of survival because of the variations. New combinations of characters thus plays important role in the evolution of species.

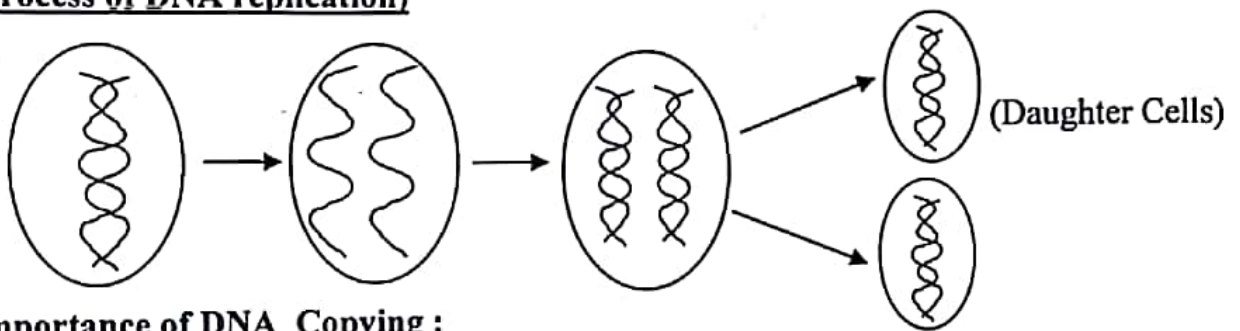
Textual Questions

SECTION - A

Q.1) *How is DNA copied in cells? (DNA Copying)*

Ans. DNA (Deoxyribonucleic acid) is copied in the cells by the process known as DNA replication. During this process the two strands of DNA get separated from each other and the new strands get attached to each parent strand formed from its building blocks called nucleotides.

(Process of DNA replication)



Importance of DNA Copying :

DNA replication helps in maintaining the same number of chromosomes in the daughter cells as that in mother cells.

- (i) Some times DNA replication helps in the formation of useful mutations.
- (ii) The variations caused due to DNA replication causes microevolution. i.e. formation of sub species or varieties.

Q.2) *Why is variation beneficial to the species but not necessarily for the individual?*

Ans. Variation is beneficial to the species as it enables a species for its survival. A favourable variation makes an organism to live better in a changed environment. e.g. A population of heat resistant bacteria in temperature of the water survives, but if the temperature of water increases by global warming most other bacteria would die. So, it is not necessarily true that a variation is beneficial to the individual always.

SECTION - B

Q.1) *How does binary fission differ from multiple fission?*

<i>Binary fission</i>	<i>Multiple fission</i>
1. The nucleus of the parent cell divides into two daughter nuclei.	1. The nucleus of the parent cell undergoes repeated divisions to produce many daughter nuclei
2. It may be irregular (amoeba),	2. Whole body divides into pieces.

Longitudinal (Euglena) or transverse (paramecia)	
3. Cytoplasmic division is followed by nuclear division	3. Nuclear division is followed by cytoplasmic division.
4. It occurs in unicellular organisms under favourable conditions	4. It takes place unicellular organisms under unfavourable conditions.

Q.2) How will an organism be benefited if it reproduces through spores?

Ans. Spores have thick walls that protect them from unfavourable conditions like lack of food, lack of water and extreme temperature, such spores are produced in large numbers. They germinate when favourable conditions return. Thus, an organism gets benefited if it reproduces through spores.

Q.3) Can you think of reasons why more complex organisms can not give rise to new individuals through regeneration?

Ans. Complex organisms have highly differentiated tissues and organs. In this case regeneration of complex individual organism is difficult from a small piece of living cells.

Q.4) Why is vegetative propagation practiced for growing some type of plant ?

An) Vegetative propagation is practiced for growing some types of plants because of following advantages.

- (i) It is used to grow a plant in which viable seeds are not formed or very few seeds are produced e.g; orange, Banana, pine apple.
- (ii) It helps to introduce plants in new areas where the seed germination fails to produce nature plant due to change in environmental factors and the soil
- (iii) It is more easier, rapid and cheaper method.
- (iv) By this method a good quality of a role or variety can be preserved.

Q.5) Why is DNA copying an essential part of the process of reproduction?

Ans. DNA copying is essential in the process of reproduction because it transmits the characters (traits) from parent to offspring and carries information to create proteins which lead to body design of the organism. If a similar individual has to be produced, the DNA should replicate to make an exact copy of itself.

SECTION - C

Q.1) How is the process of pollination different from fertilization?

<i>Pollination</i>	<i>Fertilization</i>
1. It takes place by various pollinating agencies like insects, birds, wind etc.	1. It takes place by the direct involvement of male and female organisms or by artificial means.
2. It is the transfer of pollen grains into ovary	2. It is the fusion of male and female gamete.
3. It occurs in plant kingdom only.	3. It occurs in plant and animal kingdoms.

Q.2) What is the role of seminal vesicle and prostate gland ?

Ans) The secretions from seminal vesicles and prostate glands lubricate the sperms and provide a fluid medium for easy transport of sperms. Their secretion also provides nutrient in the form of fructose, calcium and some enzymes.

SECTION - D

Q.1) Asexual reproduction takes place through budding in.

Ans) (a) Amoeba

Q.2) Which of the following is not a part of the female reproductive system in human beings?

Ans) (c) Vas deferens.

Q.3) The anther contains.

Ans) (d) Pollen grains.

Q.4) What are the advantages of sexual reproduction over asexual reproduction?

Ans) (i) Sexual reproduction leads to new combination of genes as it involves two parents and meiosis. This produces variation in offspring. Variations are the basis for evolution.

(ii) Progeny of sexual reproduction have more chance of survival because of the variation.

(iii) New combinations of characters thus play an important role in the evolution of species.

Q.5) What are the functions performed by the testis in human beings?

Ans) Testis are the sites where male gametes i.e. sperms are made. The testis also produce the male sex hormone - testosterone

Q.6) Describe the human female menstrual cycle. OR Why does menstruation occur?

Ans. The menstrual cycle in humans lasts 28 days. The days are numbered from first day of blood flow in the menstrual period. The menstrual cycle consists of 3 phases which are as described below:

a. Follicular (Proliferating) phase:- This phase lasts for about 14 days. It comprises the changes caused by following hormones.

i. F.S.H. The anterior pituitary lobe secretes follicle stimulating hormone (F.S.H) which stimulates the growth of the selected primary ovarian follicle and maturation of the primary Oocyte in this follicle. F.S.H also stimulates follicle cells to secrete estradiol

ii. Estradiol inhibits the secretion of F.S.H and stimulates the secretion of leuteinising hormone.

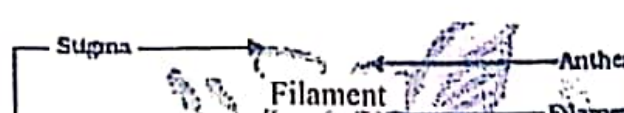
iii L.H. From the anterior pituitary causes ovulation and it occurs after about 14 days.

iv. Estradiol prepares uterus for implantation and thus formation of endometrium occurs in uterus. Fallopian tube gets thickened and its ciliary movement increases. These changes prepare the fallopian tube for conveying the ovum into the uterus.

b. Luteal or secretory phase:- This phase lasts for 10 days. Progesterone and estradiol secretion takes place by the stimulation of L.H and prolactin to empty graffian follicle. Progesterone maintains pregnancy. i.e. implantation of the foetus and stimulates endometrial glands to secrete a nutrient fluid for the foetus,

c. Menstrual or Bleeding phase:- This phase lasts for about 4 days. If fertilization does not occur, the secondary Oocyte undergoes autolysis and progesterone inhibits the release of LH from pituitary and a consequent fall in the progesterone level in the blood. The uterine lining dries due to progesterone deficiency and is sloughed off, blood vessels rupture and this causes bleeding.

Q.7) Draw a labeled diagram of the longitudinal section of a flower?



Q.8) What are the different methods of contraception ?

Ans) The contraceptive methods can be broadly directed into the following types :-

(i) **Natural method:-** It involves avoiding of the chance of meeting of sperms and ovum. In this method, the sexual act is avoided from day 10th to 17th of the menstrual cycle because during this period, ovulation is expected and therefore, the chances of fertilization are very high.

(ii) **Barrier method:-** In this method, the fertilization of ovum and sperm is prevented with the help of barriers. Barriers are available for both males and females. Condoms are barriers made of thin rubber that are used to cover penis in males and vagina in females.

(iii) **Oral contraceptives:-** In this method, tablets or drug are taken orally. They contain small doses of hormones that prevent the release of eggs and thus fertilization cannot occur.

(iv) **Implants and surgical methods contraceptive devices** such as loop or copper-T are placed in uterus to prevent pregnancy. Some surgical methods can also be used to block the gamete transfer. It includes the blocking of vas deferens to prevent the transfer of sperms known as vasectomy. Similarly, fallopian tubes of the female can be blocked so that the egg will not reach the uterus known as tubectomy.

Q.9) How are the methods for reproduction different in unicellular and multicellular organisms?

Ans) In unicellular organisms reproduction occurs by the division of the entire cell. The modes of reproduction in unicellular organisms can be fission, budding etc. Where in multicellular organisms, specialized reproductive organs are present. Therefore they can reproduce by complex reproductive methods such as vegetative propagation, spore formation etc. In more complex multicellular organisms such as human beings and plants, the mode of reproduction is sexual reproduction.

Q.10) How does reproduction help in providing stability to populations of species?

Ans) Living organisms reproduce for the continuation of a particular species. It helps in providing stability to the population of species by producing a new individual that resembles the parents. That is the reason why cats give birth to only cats or dogs give birth to only dogs. Therefore, reproduction provides stability to populations of dogs or cats or any other species.