Previous Year Question Paper

2017

1. How do cytokine barriers provide innate immunity in humans ?

Ans. **Cytokine barriers :** Virus infected cells secretes proteins called Interferons which protect non-infected cells from further viral infection.

2. Write the dual purpose served by Deoxyribonucleoside triphosphates in polymerisation.

Ans. Deoxyribonucleoside triphosphates serve dual purposes. They serves as substrates i.e. nucleotides during replication and also provide energy for polymerisation reaction by cleavage of high energy terminal phosphates bond.

3. Write the names of the following :

(a) A 15 *mya* primate that was ape-like

(b) A 2 *mya* primate that lives in East African grasslands

Ans. **(a)** About 15 mya, primates called *Dryopithecus* was more ape-like.

(b) About 2 mya, *Australopithecines* lived in East African grasslands.

4. Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin.

Ans. The proinsulin is cleaved to remove extra stretch called the C-peptide to form mature insulin having only A-chain and B-chain joined by disulphide bond.

5. Name two diseases whose spread can be controlled by the eradication of *Aedes* mosquitoes.

Ans. Dengue and Chikungunya can be controlled by the eradication of Aedes mosquito.

6. How did a citizen group called Friends of Arcata Marsh, Arcata, California, USA, help to improve water quality of the marshland using Integrated Waste Water Treatment ? Explain in four steps.

Ans. Wastewater including sewage can be treated in an integrated manner, by utilising a mix of artificial and natural processes.

(a) The conventional sedimentation, filtering and chlorine treatments are given. After this stage, lots of dangerous pollutants like dissolved heavy metals still remain.

(b) To combat this, an innovative approach was taken and the biologists developed a series of six connected marshes over 60 hectares of marshland.

(c) Appropriate plants, algae, fungi and bacteria were seeded into this area, which neutralise, absorb and assimilate the pollutants. Hence, as the water flows through the marshes, it gets purified naturally.

(d) The marshes also constitute a sanctury, with a high level of biodiversity in the form of fishes, animals and birds.

7. Your advice is sougth to improve the nitrogen content of the soil to used for cultivation of a non-leguminous terrestrial crop.

(a) Recommend two microbes that can enrich the soil with nitrogen.

(b) Why do leguminous crops not require such enrichment of the soil ?

Ans. **(a)** Azospirillum, Azotobacter, Anabaena, Oscillatoria (Any 2)

(b) Leguminous crops have symbiotic association with Rhizobium bacteria which traps N_2 directly from atmosphere and provides it to the plant and in turn gets food and shelter.

8. You have obtained a high yielding variety of tomato. Name and explain the procedure that ensures retention of the desired characteristics repeatedly in large populations of future generations of the tomato crop.

Ans. The retention of desired characteristic in large population of crop can be done by micropropogation [type of vegetative propogation].

A small part of plant is excised and grown under sterile condition in special nutrient medium to obtain many such plants which would be genetically identical to the original plants.

OR

The plants can also be propogated vergetatively by stem cutting method to obtain genetically identical plants having same desired characteristic as parent plants.

9. **(a)** Name the source plants of heroin drug. How is it obtained from the plants ?

(b) Write the effects of heroin on the human body.

Ans. **(a)** Papaver sominferum is the source plant of heroin drug. This is obtained by Acetylation of morphine, which is extracted from the latex of poppy plant (Papaver somniferum).

(b) Heroin is depressant and slow down body functions.

10. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurence of alleles of a gene is supposed to remain the same through generations ?

Ans. In a given population one can find out the frequency of occurence of alleles of a gene or a locus. This frequency is supposed to remain fixed and even remain the same through generations. Hardy-Weinberg principle stated it using algebraic equations.

This principle says that allele frequencies in a population are stable and is constant from generation to generation. The gene pool (total genes and their alleles in a population) remains a constant. this is called genetic equilibrium. Sum total of all the allelic frequencies is 1. Individual frequencies, for example, can be named p, q, etc. In a diploid, p and q represent the frequency of allele A and allele *a*. The frequency of AA individuals in a population is simply p^2. This is simply stated in another ways, i.e., the probability that an allele A with a frequency of p appear on both the chromosomes of a diploid individual is simply the product of the probabilities, i.e., p^2. Similarly of aa is q^2, of Aa 2pq. Hence, $p^2 + 2pq + q^2 = 1$. This is a binomial expansion of $(p + q)^2$. When frequency measured, differs from expected values, the difference (direction) indicates the extent of evolutionary change. Disturbance in genetic equilibrium, or Hardy-Weinberg equilibrium, i.e., change of frequency of alleles in a population would then be interpreted as resulting in evolution.

OR

10. Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain.

Ans. DNA (being negatively charged) is held with some proteins (that have positive charges) in a region termed as 'nucleoid'. The DNA in nucleoid is organised in large loops held by proteins. Also the DNA in form of single chromosomes is attached to mesosome at a point.

11. **(a)** Differentiate between analogous and homologous structures.

Ans.

Analogous Organs	**Homologous Organs**
(i) Those organs which are structurally dissimilar but functionally similar are called analogous organs.	**(i)** Those organs, which are structurally similar but functional dissimilar are called homologous organs.
(ii) They lead to convergent evolution.	**(ii)** They lead to divergent evolution.
(iii) Eg. Wings of birds and insects.	**(iii)** Eg. Forelimbs of terrestrial vertebrates such as frog, lizard, bird, bat, horse, man.

(b) Select and write analogous structures from the list given below :

(i) Wings of butterfly and birds

(ii) Vertebrate hearts

(iii) Tendrils of bougainvillea and cucurbita

(iv) Tubers of sweet potato and potato

Ans. Following are the analogous structure from the given list :

(i) Wings of butterfly and birds.

(ii) Tubers of sweet potato and potato.

12. How has the use of Agrobacterium as vectors helped in controlling Meloidegyne incogintia infestation in tobacco plants ? Explain in correct sequence.

Ans. A nematode *Meloidegyne* incognitia infects the roots of tobacco plants and causes a great reduction in yield. A novel strategy was adopted to prevent this infestation which was based on the process of RNA interference (RNAi).

Using *Agrobacterium* vectors, nematode-specific genes were introduced into the host plants. The introduction of DNA was such that it produced both sense and anti-sense RNA in the host cells. These two RNA's being complementary to each other formed a double stranded (dsRNA) that initiated RNAi and thus, silenced specific mRNA of the nematode. The consequence was that the parasite could not survive in a transgenic host expressing specific interfering RNA. The transgenic plant therefore got itself protected from the parasite.

13. **(a)** "India has greater ecosystem diversity than Norway." Do you agree with the statement ? Give reasons in support of your answer.

(b) Write the difference between genetic biodiversity and species biodiversity that exists at all the levels of biological organisation.

Ans. **(a)** Yes. India has greater ecosystem diversystem diversity than norway having deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alphine meadows.

(b) **Genetic diversity :**

(i) Genetic diversity is the total number of genetic characteristics in the genetic makeup of a species.

(ii) A single species might show high diversity at the genetic level (E.g. Man : Chinese, Indian American, African etc.) India has more than 50,000 genetically different strains of rice, and 1,000 varieties of mango.

(iii) Genetic diversity allows species to adapt to changing environments. This diversity aims to ensure that some species survive drastic changes and thus carry on desirable genes.

Specific diversity :

(i) It is the ratio of one species population over total number of organisms across all species in the given biome. 'Zero' would be infinite diversity, and 'one' represents only one species present.

(ii) Species diversity is a measure of the diversity within an ecological community that incorporates both species richness (the number of species in a community) and the eveness of species.

(iii) For example, the Western Ghats have a greater amphibian species diversity than the Eastern Ghats. There are more than 2,00,000 species in India of which several are confined to India (endemic).

14. Explain the mechanism of 'sex determination' in birds. How does it differe from that of human beings?

Ans. In birds, sex determination is of ZW – ZZ type.

In this type the males are homogametic and have ZZ sex chromosomes, and females are heterogametic with ZW pair of sex chromosomes.

Parents :	Male	X	Female
	ZZ		ZW
Gametes:	(Z)(Z)		(Z)(W)
F_1:	ZW		ZZ
	Female		Male

whereas, in human beings, the chromosomal mechanism of sex determination is of XX – XY type. The human male is heterogametic and have XY sex chromosomes and human female is homogametic with XX sex chromosomes.

15. Explain out - breeding, out - crossing and cross-breeding practices in animal husbandr y.

Ans. **Out-breeding :** Out-breding is the breeding of the unrelated animals, which may be between individuals of the same breed but having no common ancestors for 4-6 generations (out-breeding) or between different breeds (cross-breeding) or different species (inter-specific hybridisation).

Out-crossing : This is the practice of mating of animals within the same breed, but having no comon ancestors on either side of their pedigree up to 4-6 generations. The offspring of such a mating is known as an out-cross. It is the best breeding method for animals that are below average in productivity in milk production, growth rate in beef cattle, etc. A single outcross often helps to overcome inbreeding depression.

Cross-breeding : In this method, superior males of one breed are mated with superior females of another breed. Cross - breeding allows the desirable qualities of two different breeds to be combined. The progeny hybrid animals may themselves be used for commercial production. Alternatively, they may be subjected to some form of inbreeding and selection to develop new stable breeds that may be superior to the existing breeds. Many new animal breeds have been developed by this approach. Hisardale is a new breed of sheep developed in Punjab by crossing Bikaneri ewes and Marino rams.

16. **(a)** Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify.

(b) Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents.

Ans. **(a)** Chemical methods often kills both useful and harmful life forms indiscriminately. Eradication of the creatures that are often described as pests in not only possible, but also undersirable, for without them the beneficial predatory and parasitic insects which depend upon them as food or hosts would not be able to survive.

(b) Insects = Ladybird and Dragonflies.

Bacteria = Bacillus thuringiensis.

Fungus = Trichoderma

17. **(a)** How has the development of bioreactor helped in biotechnology?

(b) Name the most commonly used bioreactor and describe its working.

Ans. **(a)** Small volume cultures cannot yield appreciable quantities of products. To produce in large quantities, the development of **bioreactors,** where large volumes (100 - 1000 litres) of culture can be processed, was required. Thus, bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products, individual enzymes, etc., using microbial plant, animal or human cells. (1 mark)

(b) The most commonly used bioreactors are of stirring type. A stirred - tank reactors is usually cylindrical or with a curved base to facilitate the mixing of the reactor contents. The stirrer facilitates even mixing and oxygen availability throughout the bioreactor. The bioreactor has an agitator system, an oxygen delivery system and a foam control system, a temperature control system. pH control system and sampling ports so that small volumes of the culture can be withdrawn periodically. (2 mark)

18. Explain the roles of the following with the help of an example each in recombinant DNA technology:

(a) Restriction Enzymes

(b) Plasmids

Ans. **(a)** <u>Restriction enzymes</u>:

1. Restriction enzymes belongs to class of enzymes nucleases which breaks nucleic acids by cleaving their phosphodiester bonds.

2. Since Restriction endonucleases cuts DNA at specific recognition site,they are used to cut the donor DNA to isolate the desired gene.

3. The desired gene has sticky ends which can be easily ligated to cloning vector cut by same restriction

enzymes having complementary sticky ends to form recombinant DNA. (1 mark)

4. An example is EcoR1 which is obtained from E.coli bacteria "R" strain which cuts DNA at specific palindromic Recognition site.

5' GAATTC 3'

3' CTTAAG 5'

(b) Plasmids :

1. Plasmids are autonomous,extra chromosomal circular double stranded DNA of bacteria

2. Since they are small and self replicating,they are used as cloning vectors in genetic engineering.

3. Some plasmids have antibiotic resistance genes which can be used as marker genes to identify recombinant plasmids from non recombinant ones.

4. The plasmids are cut and ligated with desired genes and transformed into host cell for amplification to obtain the desired products.

5. An example of artificial modified plasmids are pBR322 (constructed by bolivar and rodriguez) or pUC (constructed at university at california).

19. Deffrentiate between Parthenocarpy and Parthenogenesis. Give one example of each.

Ans.

In most plants, flowers need to be pollinated and fertilized to produce fruits. However, some plants can produce fruits before fertilization or without fertilization. Parthenocarpy is the process which produces fruits from unfertilized ovules in plants. Unfertilized ovules develop into fruits prior to fertilization. These fruits do not contain seeds.

Parthenogenesis is a type of reproduction commonly shown in organisms mainly by some invertebrates and lower plants. It can be described as a process in which unfertilized ovum develops into an individual (virgin birth) without fertilization. Therefore, it can be considered as a method of asexual reproduction.

It is seen in organism like rotifers, honeybees and even some lizards and birds (turkey).

The key difference between parthenogensis and parthenocarpy is, parthenogenesis is shown by animals and plants while pathenocarpy is shown only by plants.

20. Medically it is advised to all young mothers that breastfeedings is the best for their newborn babies. Do your agree? Give reasons in support of your answer.

Ans. Yes, i do agree with the fact that breastfeeding is the best for newborn babies.

Mammary glands start producing milk at the end of pregnancy. The milk produced during the initial few days and lactation is called COLOSTRUM which contains several antibodies.

It helps in developing resistance for newborn baby. It helps the baby fight of viruses and bacteria.

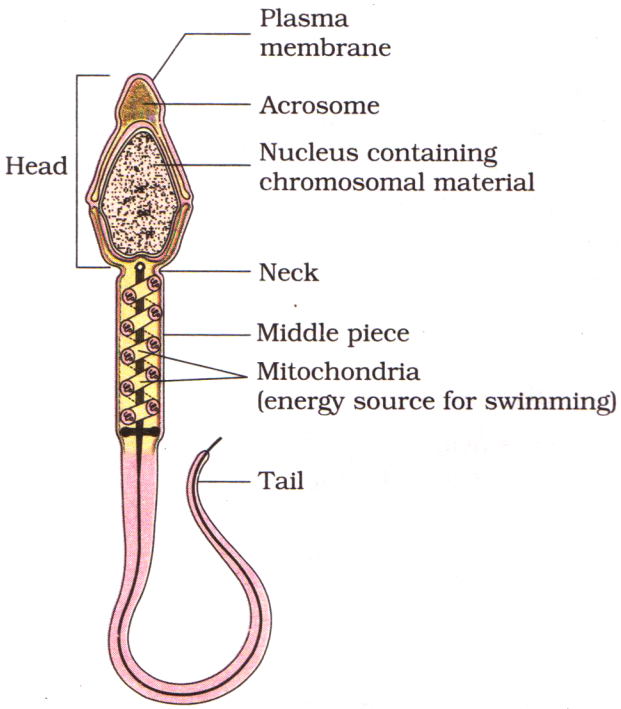
Thus breast milk is packed with disease-fighting substance that protect your baby from illness.

Breast milk also naturally contains many of the vitamins and minerals that a newborn requires.

Also, it is easily digested - no constipation, diarrhea and upset stomach.

21. Draw a diagram of a mature human sperm. Label any three parts and write their functions.

Ans.



(1) Acrosome : It is a cap like structure, filled with hydrolytic enzymes that help fertilisation of the ovum.

(2) Middle piece : Possesses numerous mitochondria, which produces energy for the movement of tail.

(3) Tail : Facilitate sperm motility essential for fertilisation.

22. **(a)** Expand VNTR and describe its role in DNA fingerprinting.

(b) List any two applications of DNA fingerprinting technique.

Ans. **(a)**

1. VNTR stands for "Variable Number of Tandem Repeats".

The VNTR belongs to a class of satellite DNA referred to as mini-satellite. A small DNA sequence is arranged tandemly in many copy numbers. The copy number varies from chromosome to chromosome in an individual. The numbers of repeat show very high degree of polymorphism. As a result th size of VNTR varies in size from 0.1 to 20 kb. Consequently, after hybridization with VNTR probe, the autoradiogram gives many bands of differing sizes. These bands give characteristic pattern for an individual DNA which is used to identify individuals.

(b) Since DNA from every tissue (such as blood, hair - follicle , skin, bone, saliva, sperm etc.), from an individual show the same degree of polymorphism, they become very useful identification tool in forensic applications to identify criminals. Further, as the polymorphisms are inheritable from parents to children, DNA fingerprinting is the basic of paternity testing, in case of disputes.

23. Looking at ahte deteriorating air quality because of air pollution in many cities of the country, the citizens are very much worried and concerned about their health. The dectors have declared health emergency in the cities where the air quality is very severely poor.

(a) Mention any two major causes of air pollution.

(b) Write the two harmful effects of air pollution to plants and humans.

(c) As a captain of your school Eco-club, suggest any two programmes you would plan to organise in the school so as to bring awareness among the students on how to check air pollution in and around the school.

Ans. (a) Two causes of air pollution

(1) Burning of fossil fuels.

(2) Smoke released from vehicles.

(3) Industrial effluents

(4) Smoke stacks of thermal power plants.

(b) Harmful effects of air pollution.

(1) It affects respiratory system of humans and of animals.

(2) It also reduces growth and yield of crops & cause premature death of plants.

(c) (1) Encouraging public transport i.e. buses & using CNG instead of diesel.

(2) Planting more trees to curb pollution.

24. (a) Write the scientific name of the organism Thomas Hunt Morgan and his colleagues worked with for their experiments. Explain the correlation between linkage and recombination with respect to genes as studied by them.

(b) How did Sturtevant explain gene mapping while working with Morgan?

Ans. (a) Drosophila melanogaster :

Morgan carried out several dihybrid crosses in Drosophila to study gens that were sex-lined.

Morgan and his group knew that the genes were located on the X chromosome and saw quickly that when the two genes in a dihybrid cross were situated on the same chromosome, the proportion of parental gene combinations were much higher than the non-parental type. Morgan attributed this due to the physical association or linkage of the two genes and coined the term linkage to describe this physical association of genes on a chromosome and the term recombination to describe the generation of non-parental gene combination. Morgan and his group also found that even when genes were grouped on the same chromosome, some genes were very tightly linked (showed very low recombination) while others were loosely linked.

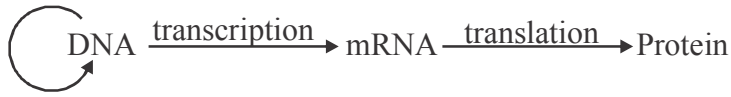
(b) Morgans student Alfred Sturtevant used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes and 'mapped' their position on the chromosome. Today genetic maps are extensively used as a starting point in the sequencing of whole genomes.

OR

(a) State the 'Central dogma' as proposed by Francis Crick. Are there any exceptions to it? Support your answer with a reason and an example.

(b) Explain how the biochemical characterisation (nature) of 'Transoforming Principle' was determined. which was not defined from Griffith's experiments.

Ans. **(a)** Francis Crick proposed the Central dogma in molecular biology, which states that the genetic information flows from DNA $\rightarrow$ RNA $\rightarrow$ Protein.



Central dogma

In some viruses, central dogma is seen in reverse directoin, that is from RNA to DNA. as RNA is the main genetic material.

Eqs: Retro virus (HIV) and the process is **Reverse transcription**.

(b) **Transforming Principle :**

In 1928, Frederick Griffith, in a series of experiments with Streptococcus pneumoniae (bacterium responsible for pneumonia), witnessed a miraculous transformation in the bacteria. During the cource of his experiment, a living organism (bacteria) had changed in physical form.

He concluded that the R strain bacteria had somehow been tranformed by the heat - killed S strain bacteria. Some 'transforming principle', transferred from the heat - killed S strain, had enabled the R strain to synthesise a smooth polysaccharide coat and become virulent. This must be due to the transfer of the genetic material. However, the biochemical nature of genetic material was not defined from his experiments.

Oswald Avery, Colin MacLeod and Maclyn McCarty worked to determine the biochemical nature of 'tranforming principle' in Griffith's experiment.

They purified biochemicals (proteins , DNA, RNA, etc.) from the heat - killed S cells to see which ones could transform live R cells into S cells. They discoveredfthat DNA alone from S bacteria caused R bacteria to become transformed.

They also discovered that protein - digesting enzymes (proteases) and RNA - digesting enzymes (RNases) did not affect transformation, so the transforming substance was not a protein or RNA. Digestion with DNase did inhibit transformation, suggesting that the DNA caused the transformation. They concluded that DNA is the hereditary material, but not all biologist were convinced.

25. **(a)** Following are the responses of different animals to various abiotic factors. Describe each one with the help of an example.

(i) Regulate

(ii) Conform

(iii) Migrate

(iv) Suspend

Ans. **(i)** **Regulate :** Some organisms are able to maintain homeostatis by regulating their body temperatures. The mechanisms used by most mammals to regulate their body temperature are similar to what we humans use.

Eg: Body temperature remains constant at 37^0C. In summer, when outside temperature is more than our body temperature, we sweat profusely and when the temperature is much lower than 37^0C, we shiver thus body temperature remains constant.

(ii) **Conform :** Many animals, cannot maintain a constant internal environment. Their body temperature changes with the ambient temperature. These are conformers. Heat loss or heat gain is a function of surface area. Since small animals have a larger surface area relative to their volume, they tend to lose body heat very fast when it is cold outside.

Eg. Shrews and humming birds.

(iii) **Migrate :** The organism can move away temporarly from the stress ful habitat to a more hospitable area & return when stressful period is over.

Eg: Every winter, the famous Keolado National Park in Bharatpur host thousands of migratory birds coming from Siberia & other northern regions.

(iv) **Suspend:** In animals, if migration is not possible, they might avoid the stress by escaping in time.

Eg: (1) Bears go into hibernation during winter.

(2) Fishes go into aestvation to avoid summer related problems heat & dessication.

(b) If 8 individuals in a population of 80 butterflies die in a week, calculate the death rate of population of butteflies during that period.

Ans. Deat Rate : Number of deaths per 1000 individuals of a population

$$\text{Death Rate} = \frac{8}{80} = 0.1$$

OR

(a) What is a trophic level in an ecosystem ? What is 'Standing crop' with reference to it ?

(b) Explain the role of the 'first trophic level' in an ecosystem.

(c) How is the detritus food chain connected with the grazing food chain in a natural ecosystem ?

Ans. **(a)** Tropic level : Organisms occupy a place in the natural surroundings or in a community according to their feeding relationship with other organisms. Based on the source of their nutrition or food, organisms occupy a specific place in the food chain and this is known as trophic level.

Each trophic level has a certain mass of living material at a particular time and this is called as Standing crop. It is measured as the mass of living organisms (biomass) or the number in a unit area.

(b) First trophic level is formed by producers.

This is the basic unit.

These organisms can live without feeding on any another level.

The only thing that these organisms need to survive is sunlight and water which they can turn into energy themselves.

All other trophic levels depend on this level for energy.

(c) GFC is Grazing Food Chain : It is depicted as below :

Producers $\rightarrow$ Primary consumers $\rightarrow$ Secondary consumers

DFC is Detritus Food Chain : It begins with dead organic matter. It is made up of decomposers which are heterotrophic organisms like fungi, bacteria etc.

GFC is the major conduct for energy flow. DFC may be connected with GFC at some levels : Some of the organisms of DFC are prey to the GFC animals.

Producers $\xrightarrow{\downarrow Decomposers}$ Primary consumers $\xrightarrow{\downarrow Decomposers}$ Secondary consumers.

These natural inter connection of food chains forms <u>food web</u>.

26. **(a)** Describe any two devices in a flowering plant which prevent both autogamy and geitonogamy.

Ans. Autogamy : Transfer of pollen grains from anther to the stigma of same flower.

Geitonogamy : Transfer of pollen grains from anther to the stigma of another flower of same plant.

Two devices that prevent both autogamy and geitonogamy are :

(i) <u>Self – incompatibility :</u> This is a genetic mechanism & prevents self pollen from fertilising the ovules by inhibiting pollen germination or pollen tube growth in the pistil.

(ii) <u>Dioecious plants :</u> Male and female flowers are present on different plants, that is each plant is either male or female.

(b) Explain the events upto double fertilisation after the pollen tube enters one of the synergids in an ovule of an angiosperm.

Ans. The events seen after the pollen tube enters one of the synergids in an ovule are as follows :

(i) Pollen tube, after reaching the ovary, enters the ovule through the micropyle and thus enters one of the synergids through filiform apparatus.

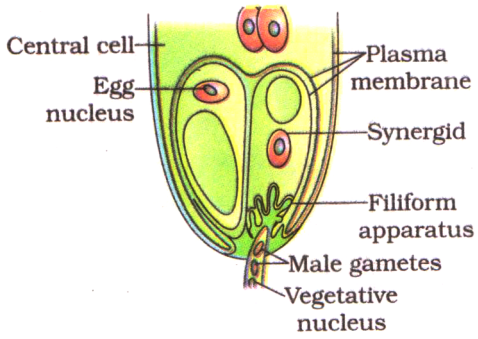
(ii) After entering one of synergids, the pollen tube releases the two male gametes into the cytoplasm of the synergid.

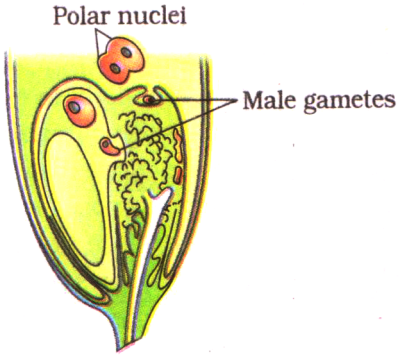
(iii) One of the male gametes move towads the egg cell and fuses with its nucleus thus results in formation of zygote (diploid cell). This is <u>Syngamy</u>.

(iv) The other male gamete move towards the two polar nuclei located in the central cell and fuses to form triploid primary endosperm nucleus (PEN). This involves fusion of three haploid nuclei & hence termed as <u>triple fusion</u>.

(v) Two types of fusions, syngamy & triple fusion takes place in an embryosac and hence the phenomenon is termed as <u>double fertilisation</u>.

(vi) After fertilisation, PEN becomes the primary endosperm cell (PEC) & develops into endosperm while zygote develops into an embyo.





OR

(a) Explain mentrual cycle in human females.

Ans. Menstrual Cycle :

(i) The reproductive cycle in the female primates (e.g. Monkeys, apes and humans) is called menstrual cycle.

(ii) The first menstruation begins at puberty and is called menarche.

(iii) In human females, menstruation is repeated at an average interval of about 28/29 days and the cycle of events starting from one menstruation till the next one is menstrual cycle.

(iv) The phases of menstrual cycle are as follows :

1. Menstrual phase : It lasts for 3-5 days. The menstrual flow results due to breakdown of endometrial lining of the uterus and its blood vessels which forms liquid that comes out through vagina. Menstruation only occurs if the released ovum is not fertilised.
2. Follicular phase : It lasts for 8-10 days. During this phase, the primary follicles in the ovary grow to become a fully mature Grafian follicle and simultaneously the endometrium of uterus regerates through proliferation. The secretion of LH and FSH increases gradually.
3. Ovulatory phase : It lasts for 1 day. There is release of ovum.
4. Luteal phase : It lasts for 13 days. There is LH surge. These induces the remaining parts of Grafian follicle to tranform as corpus luteum and its secretes progesterone.

(v) If fertilisation occurs, endomentrium starts preparing for implantation.

In the absence of fertilisation, corpus luteum degenerate.

(b) How can the scientific understanding of the mentrual cycle of human females help as a contraceptive measure ?

Ans. Scientific understanding of menstrual cycle of human females are very important as a contraceptive measures. It helps in following ways :

(i) Safe period (Rhythm method)

A week before and a week after menstrual bleeding is considered as safe period for sexual intercourse. The idea is based on following facts :

(A) Ovulation occurs on 14^{th} day of cycle and ovum survives for about 2 days.

(B) Sperms remain alive for about 3 days.

This method reduces the chances of pregenancy by about 80%.

(ii) Pills used by emales are also dependent on menstrual cycle. The pills have to be taken daily for a period of 21 days starting preferably within first five days of menstrual cycle. It is repeated again after period of 7 days. These inhibit ovulation abd implantation as well as alter the quality of cervical mucus to prevent/retard entry of sperms.