

CBSE Class 12 Biology Solved Question paper 2018

Question Paper Series: SGN

Question Paper Code: 57/3

Set-3

Question1. How do cytokine barriers provide innate immunity in humans?

Ans: Cytokines including interferons, lymphokines, necrosis factor etc. protect the non-infected cells from further viral infection by modulating the immune system in response to infection.

Question2. Write the dual purpose served by Deoxyribonucleoside triphosphates in polymerisation.

Ans: The dual purpose served by Deoxyribonucleoside triphosphates in polymerisation:

- i. Substrates for DNA synthesis.
- ii. They provide energy for polymerisation reaction.
- iii. They are the essential building blocks of nucleic acid and are necessary components of PCR mixes

Question3. Write the names of the following:

- (a) A 15 mya primate that was ape-like
- (b) A 2 mya primate that lived in East African grasslands

Ans:

- (a) Dryopithecus and
- (b) Australopithecines.

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Question4. Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin.

Ans: After cleavage of the C-peptide, these 2 pairs of basic residues (lysine-64 and arginine-65, and arginine-31 and -32) are removed by the carboxypeptidase. The C-peptide is the central portion of proinsulin, and the primary sequence of proinsulin goes in the order "B-C-A" (the B and A chains were identified on the basis of mass and the C-peptide was discovered later).

Question5. Name two diseases whose spread can be controlled by the eradication of Aedes mosquitoes.

Ans: Dengue and chikungunya are spread by Aedes mosquitoes.

Section B

Question6. 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:

Artificial and natural process is involved to treat wastewater including sewage and an integrated manner.

It has been done in the town of Arcata, in the northern coast of California. The treatment is done in four stages:-

Stage 1: Physical impurities are removed by the conventional sedimentation, filtering and chlorine treatment.

Stage 2: The biologists developed a series of six connected marshes over 60 hectares of marshland.

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Stage3: Appropriate plants, algae, fungi and bacteria were seeded into 60 hectares of marshland which would help in neutralizing, absorbing and assimilating the pollutants.

Stage4: Finally, water gets purified naturally when it flows through the marshes.

Question7. Your advice is sought to improve the nitrogen content of the soil to be 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:

1) Two microbes that can enrich the soil with nitrogen are Nostoc and Anabaena.

2) in Legume plants nitrogen is fixed symbiotically as they have nodules on their roots, with bacteria rhizobium whose function is to fix the atmospheric nitrogen directly into the soil. These nodules contain all the necessary components for nitrogen fixation.

Question8. 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:

Micropropagation and cell tissue culture are the process by which we can get the high yielding variety of tomato.

In micro propagation and cell tissue culture we take meristem cells from apex and grow it in the agar agar medium with the intake of some hormones (such as indole-3-acetic acid (IAA) or naphthaleneacetic acid (NAA) in otherwise simple media comprised of mineral salts, a reduced carbon source (usually sucrose) and a few vitamins, especially thiamine) too we do micro propagation.

Question9. (a) Name the source plant of heroin drug. How is it obtained from plant?

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

Ans:

(a) Poppy plant (*Papaver somniferum*) is the source of heroin drug. This is extracted from the latex of the poppy plant.

(b) Effects of heroin drug on the human body are:

- It depresses breathing
- It slows down body functions.

Question10. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations?

OR

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

Ans:

Hardy-Weinberg's principle.

Allele frequencies in a population are stable and remain constant from generation to generation.

This law is represented through a binomial expansion of $(p+q)^2$.

The equation $p^2 + 2pq + q^2 = 1$

Where,

p – frequency of allele A,

q – frequency of allele a, p^2 – frequency of AA (homozygous) individuals in a population

q^2 – frequency of aa (homozygous) individuals

$2pq$ – frequency of Aa (heterozygous) individuals

Also, the sum total of all the allelic frequencies is equal to 1.

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The disturbance in genetic equilibrium results in evolution, thus the presence of any difference indicates the extent of evolutionary change.

OR

Ans:

Chromatin fibres can be seen floating around undefined nucleus. Prokaryotic cells do take up a measure against this by folding the fibres and forming something known as 'genophore'.

This folding is the main reason why the DNA doesn't get scattered inside the cell.

Section C

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

(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: (a)

Homology: Those structure which have similar anatomy but perform different functions shows homology.

Homology points to development of a similar structure in different directions. So it follows different divergent evolution.

Analogy: Those structure which have similar functions but different anatomy shows analogy.

Analogy points to different structures evolving for the same function indicating convergent evolution.

Ans: (b)

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- (i) Analogous because their origin is different though functionally same , i.e., flying.
- (ii) Homologous because their origin is similar and have auricle and ventricle.
- (iii) Homologous because both have same origin though functionally different
- (iv) Analogous because Tubers of potato are modified stems and that of sweet potato is modified root.

Question12. How has the use of Agrobacterium as vectors helped in controlling *Meloidegyne incognitia* infestation in tobacco plants ? Explain in correct sequence.

Ans:

The following steps were taken utilizing Agrobacterium as a transforming vector for tobacco plants to make them immune against the infestation of a nematode *Meloidegyne incognitia*:

- Suitable plasmid vectors are chosen and the specific nematode gene is inserted into it.
- The recombinant plasmids are introduced into the competent Agrobacterium cells.
- The transformed Agrobacterium cells are screened and selected to infect the tobacco plants.
- Agrobacterium infection on the tobacco plant cultures leads to insertion and integration of nematode-desired DNA fragment within the tobacco plant.
- Correct insertion of nematode gene into the host tobacco plants leads to silencing of an essential housekeeping gene of the *Meloidegyne incognitia* pest by RNAi.

Question13. (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.

OR

Explain the effect on the characteristics of a river when urban sewage is discharged into it.

Ans.

(a) In our biosphere immense diversity (or heterogeneity) exists not only at the species level but at all levels of biological organisation ranging from macromolecules within cells to biomes.

Biodiversity is the term popularized by the sociobiologist Edward Wilson to describe the combined diversity at all the levels of biological organisation. Ecological diversity: At the ecosystem level, India, for instance, with its deserts, rain forests, mangroves, coral reefs, wetlands, estuaries, and alpine meadows has greater ecosystem diversity than a Scandinavian country like Norway.

b) Differences between Genetic Diversity and Species Diversity are given below:

Genetic biodiversity:

- It is related to number of genes and their alleles found in organisms.
- It is the trait of the species.
- It influences adaptability and distribution of a species in diverse habitats.

Species biodiversity:

- It is related to number and distribution of species found in an area.
- It is the trait of the community
- It influences biotic interactions and stability of the community.

OR

Ans.

Effects on characteristics of a river, when urban sewage is discharged:

Solids are relatively easy to remove, but most difficult to remove are dissolved salts such as nitrates, phosphates, and other nutrients, and toxic metal ions and organic compounds.

1) Domestic sewage primarily contains biodegradable organic matter, which readily decomposes –thanks to bacteria and other micro-organisms, which can multiply using these organic substances as substrates and hence utilise some of the components of sewage. It is

possible to estimate the amount of biodegradable organic matter in sewage water by measuring Biochemical Oxygen Demand (BOD).

2) Micro-organisms involved in biodegradation of organic matter in the receiving water body consume a lot of oxygen, and as a result there is a sharp decline in dissolved oxygen downstream from the point of sewage discharge. This causes mortality of fish and other aquatic creatures.

3) Presence of large amounts of nutrients in waters also causes excessive growth of planktonic (freefloating) algae, called an algal bloom which imparts a distinct colour to the water bodies. Algal blooms cause deterioration of the water quality and fish mortality. Some bloom-forming algae are extremely toxic to human beings and animals.

Question14. Explain the mechanism of 'sex determination' in birds. How does it differ from that of human beings?

Ans:

Sex determining mechanism in humans is XY type. Out of 23 pairs of chromosomes present, 22 are autosomes. A Pair of X chromosomes is present in females, whereas an X and Y chromosome are present in males. During spermatogenesis among males, two types of gametes are produced.

2.50 percent of the total sperm produced carry the X chromosome and the rest 50 percent has Y chromosome. In 16 case, the ovum fertilizes with the sperm carrying X chromosomes the Zygote develops into female ('XX') and with 'Y' chromosomes the zygote results into male offspring(XY).

In birds, female birds have been designated to have Z and W chromosomes, whereas males have a pair of Z chromosomes besides autosomes.

Question15. Explain out-breeding, out-crossing and cross-breed husbandry.

Ans:

Breeding of animals is an important aspect of animal husbandry. Animal breeding aims at increasing the yield of animals and improving the desirable qualities of the produce.

Out-breeding : Out-breeding 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-crossing) 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 common 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.

Question16. (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) In agriculture, there is a method of controlling pests that relies on natural predation rather than introduced chemicals. More variety a landscape has, the more sustainable it is. The organic farmer, therefore, works to create a system where the insects that are sometimes called pests are not eradicated, but instead are kept at manageable levels by a complex system of checks and balances within a living and vibrant ecosystem.

Contrary to the 'conventional' farming practices which often use chemical methods to kill both useful and harmful life forms indiscriminately, this is a holistic approach that seeks to develop an understanding of the webs of interaction between the myriad of organisms that constitute the field fauna and flora.

The organic farmer holds the view that the eradication of the creatures that are often described as pests is not only possible, but also undesirable, for without them the beneficial predatory and parasitic insects which depend upon them as food or hosts would not be able to survive. Thus, the use of biocontrol measures will greatly reduce our dependence on toxic chemicals and pesticides.

(b) **Bacteria:** *Bacillus thuringiensis*-to control butterfly caterpillars

Fungus: *Trichoderma*- use in the treatment of plant disease

Insect: the Ladybird, and Dragonflies- useful to get rid of aphids and mosquitoes, respectively

Question17.

(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.

(b) The most commonly used bioreactors are of stirring type. A stirred - tank reactor 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.

Question18. Explain the roles of the following with the help of an example each in recombinant DNA technology.

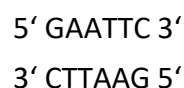
(a) Restriction Enzymes

(b) Plasmids

Ans:

(a) Restriction Enzymes

- Restriction enzymes belong to class of enzymes nucleases which breaks nucleic acids by cleaving their phosphodiester bonds.
- Since Restriction endonucleases cuts DNA at specific recognition site, they are used to cut the donor DNA to isolate the desired gene.
- 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.
- An example is EcoR1 which is obtained from E.coli bacteria "R" strain which cuts DNA at specific palindromic Recognition site.



(b) Plasmids:

- Plasmids are autonomous, extra chromosomal circular double stranded DNA of bacteria
- Since they are small and self replicating, they are used as cloning vectors in genetic engineering.
- Some plasmids have antibiotic resistance genes which can be used as marker genes to identify recombinant plasmids from non recombinant ones.
- The plasmids are cut and ligated with desired genes and transformed into host cell for amplification to obtain the desired products.
- An example of artificial modified plasmids are pBR322, pUC

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Question19. Differentiate 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).

Parthenogenesis is shown by animals and plants while Parthenocarpy is shown only by plants.

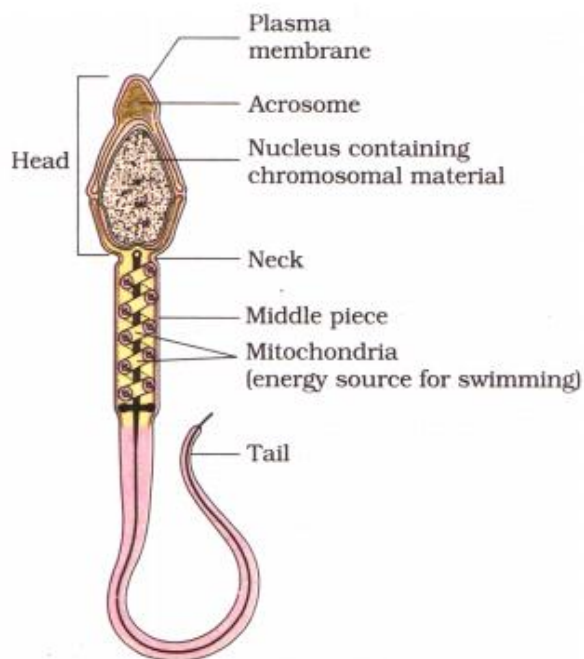
Question20. Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree? Give reasons in support of your answer.

Ans:

Yes, i do agree with the fact that breastfeeding is the best for newborn babies. Mammary glands present in the breast start producing milk at the end of pregnancy. The milk produced during the initial few days and lactation is called **COLOSTRUM, the first milk** which contains several antibodies [(immunoglobulins (Ig)]. 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 protects your baby from illness. Breast milk also naturally contains many of the vitamins and minerals that a newborn requires.

Question21. Draw a diagram of a mature human sperm. Label any three parts and write their functions.

Ans:



- Middle piece: Possesses numerous mitochondria, which produces energy for the movement of tail.
- Acrosome: It is a cap like structure, filled with hydrolytic enzymes that help fertilisation of the ovum.
- Tail: Facilitate sperm motility essential for fertilisation.

Question22.

- (a) Expand VNTR and describe its role in DNA fingerprinting.
- (b) List any two applications of DNA fingerprinting technique.

Ans:

(a) VNTR: 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 the size of VNTR varies in size from 0.1 to 20 kb.

Consequently, after hybridisation with VNTR probe, the autoradiogram gives many bands of differing sizes. These bands give a characteristic pattern for an individual DNA. It differs from individual to individual in a population except in the case of monozygotic (identical) twins. The sensitivity of the technique has been increased by use of polymerase chain reaction (PCR). Consequently, DNA from a single cell is enough to perform DNA fingerprinting analysis.

(b) In addition to application in forensic science, it has much wider application, such as

- In determining population
- . Genetic diversities

Section D

Question23. Looking at the 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 doctors 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 any 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 organize 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: you can choose any two

(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.

Section E

Question 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) Explain how the biochemical characterization (nature) of “Transforming Principle” was determined, which was not defined from Griffith’s experiments.

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 characterization (nature) of “Transforming Principle” was determined, which was not defined from Griffith’s experiments.

Ans:

(a) *Drosophila melanogaster*

Morgan carried out several dihybrid crosses in *Drosophila* to study genes that were sex-linked.

The crosses were similar to the dihybrid crosses carried out by Mendel in peas. For example Morgan hybridised yellow-bodied, white-eyed females to brown-bodied, red-eyed males and intercrossed their F₁ progeny. He observed that the two genes did not segregate independently of each other and the F₂ ratio deviated very significantly from the 9:3:3:1 ratio (expected when the two genes are independent). 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 combinations.

(b) His 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 as was done in the case of the Human Genome Sequencing Project.

OR

(a) Central dogma as proposed by Francis Crick:

"DNA makes RNA makes proteins, which in turn facilitate the previous two steps as well as the replication of DNA", or simply "DNA → RNA → protein".

Exceptions to the central dogma

The biggest revolution in the central dogma was the discovery of retroviruses, which transcribe RNA into DNA through the use of a special enzyme called reverse transcriptase has resulted in an exception to the central dogma; RNA → DNA → RNA → protein. Also, some virus species are so primitive that they use only RNA → proteins, having not developed DNA. With the discovery of prions, a new exception to the central dogma has been discovered, Protein → Protein. That is, proteins directly replicating themselves by making conformational changes in other proteins. Although retroviruses, certain primitive viruses, and prions may violate the central dogma, they are technically not considered

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"alive", and thus the rule that "all cellular life follows the central dogma" still holds true.

(b) Biochemical Characterisation of Transforming Principle

Prior to the work of Oswald Avery, Colin MacLeod and Maclyn McCarty (1933-44), the genetic material was thought to be a protein. They worked to determine the biochemical nature of 'transforming 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 discovered that 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 biologists were convinced.

Question 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

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

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)

(i) Regulate: Some organisms are able to maintain homeostasis 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°C. In summer, when outside temperature is more than our body temperature, we sweat profusely and when the temperature is much lower than 37°C, 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.

Example: Shrews and humming birds.

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

Example: 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.

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

(2) Fishes go into aestivation to avoid summer related problems heat & desiccation.

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

Death Rate: Number of deaths per 1000 individuals of a population

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

OR

Ans.

(a) Trophic 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:

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

These natural inter connection of food chains forms food web.

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

(b) Explain the events up to double fertilization after the pollen tube enters one of the synergids in an ovule of an angiosperm.

OR

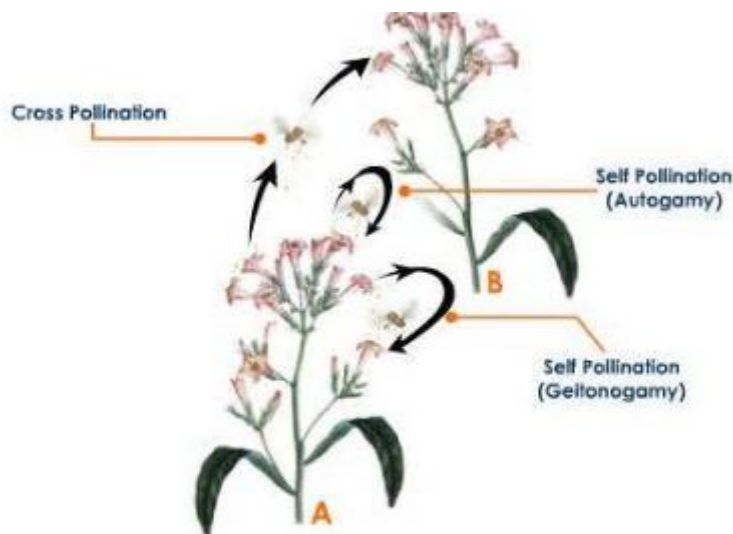
(a) Explain menstrual cycle in human females.

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

Ans:(a)

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) **Self – incompatibility:** This is a genetic mechanism & prevents self pollen from fertilising the ovules by inhibiting pollen germination or pollen tube growth in the pistil.

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

(b)

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 towards the egg cell and fuses with its nucleus thus results in formation of zygote (diploid cell). This is Syngamy.
- (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 triple fusion.
- (v) Two types of fusions, syngamy & triple fusion takes place in an embryosac and hence the phenomenon is termed as double fertilisation.
- (vi) After fertilisation, PEN becomes the primary endosperm cell (PEC) & develops into endosperm while zygote develops into an embryo.



OR

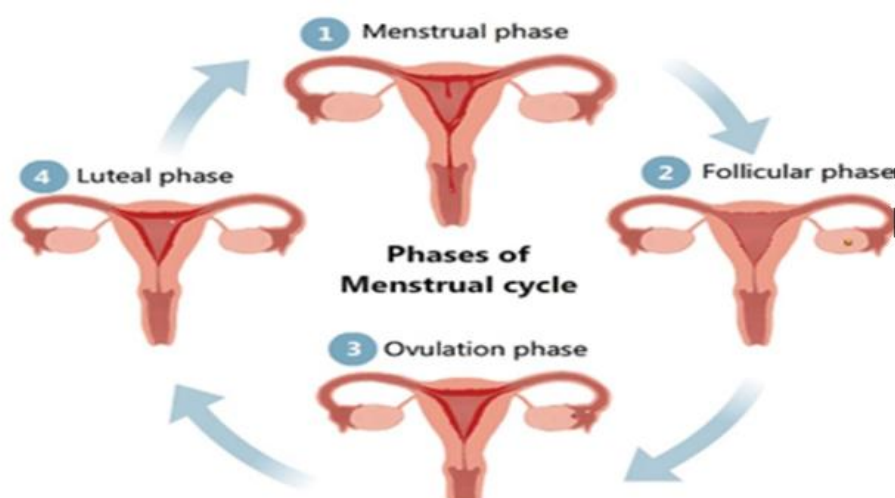
Ans (a). Menstrual Cycle:

(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 Graafian follicle and simultaneously the endometrium of uterus regenerates 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. This induces the remaining parts of Graafian follicle to transform as corpus luteum and it secretes progesterone.

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If fertilisation occurs, endometrium starts preparing for implantation.

In the absence of fertilisation, corpus luteum degenerates.