

Kerala Board
Class X Biology
Sample Paper – 8 (Solution)

Section A

1. This is due to depletion of estrogen hormone during menopause i.e. at about 50 years of age.
2. It is non-disjunction of sex chromosomes leading to trisomy. Patient possesses 47 chromosomes instead of normal 46.
3. Matching of histocompatibility between the donor and recipient to prevent graft rejection due to recipient's immune system.
4. These are more tolerant to abiotic stresses.
5. It is used to separate the fragments of DNA.
6. Insulin from animal sources used to cause allergy and reactions in human beings so it was genetically engineered in bacteria.
7. The present process of extinction is due to human intervention and is not gradual but is at alarmingly fast rates which are a threat to ecological balance and even human survival.
8. Curve 'a'.

Section B

9. The embryo of the seed is formed from the zygote at the micropylar end of the embryo sac. The zygote divides only after certain amount of endosperm is formed. So the endosperm development precedes embryo development. This is an adaptation to provide assured nutrition to the developing embryo. That is why, the zygote is considered dominant for some time in a fertilized ovule.
10. In diploid organisms, there are two copies of each gene i.e., a pair of alleles and these alleles need not to be identical. The normal allele produces the normal enzyme. The changed or modified allele can produce (i) The normal enzyme or (ii) a non-functional enzyme or (iii) no enzyme at all. In the first case, the modified allele produces the same phenotype i.e, transformation of substrate.

11. It is the starting point where replication of DNA begins at a specific point where interwind DNA segments start unwinding. In prokaryotic cells, there is a single origin of replication whereas in eukaryotic cells there are numerous origins which together during the process of replication.

12.

Leading strand		Lagging strand	
(i)	It is synthesized continuously without any gap prior to the other strand.	(i)	It is synthesized discontinuously in short fragments afterwards the first strand.
(ii)	It does not need ligase enzyme.	(ii)	It needs DNA ligase enzyme for joining okazaki fragments.

13. Primase enzyme synthesizes the primer during DNA replication. The DNA polymerase adds deoxyribonucleotides to the primer at the end in a sequence as influenced by the template.

14.(i) It carries specific amino acids from the cytoplasm to the ribosomal sites for the formation of polypeptide chain according with the sequence specified by m-RNA.

(ii) The t-RNA charged with the amino acid serves as an adaptor molecule to decode the information on the m-RNA.

15. Biological control method is based on the ability of the predator to regulate prey population. This is called as predation. Predators help in maintaining the prey species diversity in a community and protect the plant species from being eaten away by the pests.

16. The signs of secondary succession appear in an area where primary or earlier community in an area was destroyed either by forest fire, flood or due to ploughing of field. The secondary succession ends when it is occupied by dominant species to reach the climatic climax.

17. Carbon dioxide and methane are the green houses gases. These gases absorb the infrared radiation emitted from the earth surface and don't allow them to escape into space. The molecules of these gases radiate heat energy and thus raise the earth temperature. In the absence of these gases, the average temperature at surface of Earth would have been a chilly -18°C rather than the present average of 15°C.

18. Harmful effects of consuming alcohol:

(i) Consumption of alcohol results in fatty liver syndrome which leads to cirrhosis where liver cells are replaced by fibrous tissue.

(ii) It results in lowering blood sugar level and thus acts as a depressant of CNS (central nervous system).

Or

At the site of injury, histamine is released from lymphocytes which causes the vasodilation, redness, swelling and generation of heat. This is called as inflammatory response. In systematic inflammatory response, WBC's count of the blood increase considerably in order to set the body's thermostat at a higher temperature.

Section C

19. Chasmogamous flowers are the flowers which are similar to the flowers of other species with exposed anthers and stigma e.g. Oxalis and Commelina. Cross pollination do not occur in cleistogamous flowers because:

(i) These flowers do not open at all.

(ii) The anthers and stigma lie close to each other, when the anthers dehisce in the flower buds; pollen grains come in contact with the stigma to affect pollination.

20. (i) Changes in uterus during menstruation: Endometrial lining and uterine epithelium glands are sloughed off, bleeding occurs due to rupture of blood vessels.
- (ii) Changes in uterus during proliferative phase: Repairing of endometrial lining, increase vascular supply, endometrium enlarges, uterine glands become cork screw shaped, uterine movement increases.
- (iii) Changes in uterus during secretory phase: Hypertrophy of uterine endometrium for implantation, endometrial glands become complicated, active and cork screw shaped.

21. People having blood group AB are called as universal recipient.

AB blood does not cause clumping of corpuscles of any group and so, the people with AB blood can receive blood from the persons of all the blood groups. AB blood contains both A and B type of antigens in the RBC but no antibodies in the plasma. Its genotype is represented as $I^A I^B$.

People with blood group O are called as universal donor.

It is because they can give blood to all and can receive only from their own blood group. O blood group lacks antigen in the RBC and is not clumped by the serum of any blood group. Its genotype is represented as $I^O I^O$ or ii.

22. All human beings bear 23 pairs of chromosomes. The first 22 pairs of chromosomes are called as autosomes and the last 23rd pair is called as sex chromosome. In the human female, it is represented by XX. During gamete formation, at meiosis – I, if the homologous sex chromosome does not get separated (non-disjunction) then the human female ova possesses 24 chromosomes (22 + XX) instead of normal (22 + X). When such an ovum is fertilized by a sperm containing Y chromosome (22 + Y), then it results in offspring with (44 + XXY) chromosomes. This condition is known as Klinefelter's syndrome and is found only in males.

23. The transplanted organs are sometimes rejected because immune system recognizes the 'non-self' organ. The implanted organ acts as antigenic to the host, which reacts by the production of T effector lymphocytes. These invade the tissue surrounding the grafted organ and reject the graft. In order to avoid such rejections, the drugs like immunosuppressants (heavy doses of cortisol and cyclosporine) are used.

24. Allergy is the hypersensitivity of the body to certain foreign substances. The allergy causing substances are called as allergens.

Allergic reaction in the body is related with the immune system of the body. When the immune system of the body is weak, then sufficient antibodies (IgE) are produced in response to the entry of antigen (allergens-mites in dust, pollens and animal dander etc.). The allergens, then combine with the mast cells and cause its bursting. A sufficient quantity of histamine and serotonin is released with the mast cells resulting in inflammatory response. The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy.

25. The genetic modification in plants has:

- (i) Made crops more tolerant to abiotic stresses.
- (ii) Reduced dependency on chemical pesticides.
- (iii) Helped to reduce post harvest losses.
- (iv) Increased efficiency of mineral usage by plants.
- (v) Enhanced the nutritional value of food e.g., vitamin A enriched rice.

(Any three points)

26. (i) An orchid plant growing on a mango branch and barnacles growing on the back of a whale, are the example of commensalism. In these interactions, neither the mango nor the whale is deriving any benefit.
- (ii) The egret always moves closely with the cattle in the grazing field. As the cattle move, the insects stir up and flush out from the grass and the egret easily catches these insects for its feed. So, in this interaction, egret is benefitted and the cattle are neither benefitted nor harmed.
- (iii) The sea anemone has stinging tentacles and the clown fish lives among them. The fish gets protection from predators due to stinging tentacles of sea anemone. The sea anemone does not get any benefit by hosting the clown fish.

27. The main source of energy in biosphere is 'Sun'. During photosynthesis, solar energy is converted into chemical energy in the plants. Plants are consumed by herbivores and chemical energy of plants is partially transferred to herbivores animals. Carnivores consume herbivorous animals, thereby chemical energy of herbivores is transferred to carnivores. That is why, we can say that flow of energy in the biosphere is unidirectional.

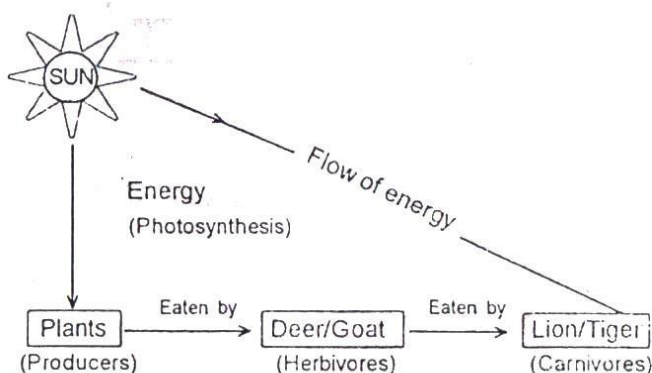


Diagram illustrating the unidirectional flow of energy in the biosphere

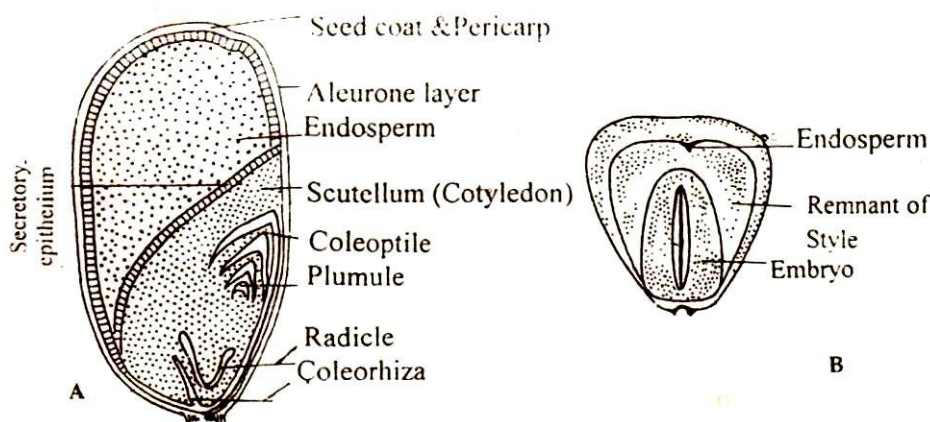
Or

The small animals do not maintain thermoregulation as it is an energetically expensive process. The small animals have larger surface area relative to their volume. They tend to lose body heat very fast when it is cold outside. Ultimately, they have to expend much energy to generate body heat through metabolism. That is why, very small animals are rarely found in polar region.

Section - D

28. It consists of:

- (i) Seed Coat: It is a thin layer that surrounds the whole grain. It is a single seeded fruit where seed coat and fruit wall is fused together.
- (ii) Endosperm: It occupies the larger part towards the rounded end. It is filled with stored food mainly starch. It is surrounded by a sheath of special tissue called aleurone layer. It contains abundant protein.
- (iii) Embryo: The embryo consists of single cotyledon called the scutellum. It is thin, small and without food. It has secretory epidermal tissues, which are in direct contact with endosperm for absorption of nutrition. The region of embryonic axis below the cotyledon is the radicle covered with protective sheath, coleorhiza. Above the point of attachment of the cotyledon, the embryonic axis becomes the plumule which is enclosed by a leaf like covering called the coleoptile.



Or

- (i) **Seminal Vesicles:** These are paired, tubular, club shaped structures situated just above the prostate gland and near the base of urinary bladder and at the interior of the rectum. The ducts from the seminal vesicles join the posterior part of vas deferens and form the common ejaculatory duct. The seminal vesicles secrete clear alkaline, yellowish, viscous fluid and contain globulin, citrate, inositol, fructose and flavins. Fructose provides energy to facilitate the motility of sperms after ejaculation and flavin gives semen a strong fluorescence in UV light. The secretion of seminal vesicles constitutes about 60% part of the ejaculate.
- (ii) **Prostate Gland:** It is the largest auxiliary gland with chestnut like shape situated around the 1st part of the urethra below the urinary bladder. It is surrounded by a thin and dense capsule of fibrous connective tissue and muscle fibres which provides firm palpation to it. It secretes milky, thin and alkaline fluid containing citric acid, bicarbonate ions, lipids and acid phosphatase that gives characteristic seminal order and alkalinity to the ejaculate. It increases the motility of the sperms and neutralizes the acidity of urine. It constitutes about 5-30% of the ejaculate.
- (iii) **Cowper's glands (Bulbourethral glands):** These are paired gland situated beneath the bladder and on each side of the urethra into which their ducts open. They are about the size of pea seed and form the floor of the pelvis. They secrete clear, white, viscous, alkaline, mucoid lubricant that neutralize the activity of acidic female vaginal secretions and increase the mobility and survival potentiality of sperms in the genital tract of female.

29. Features of double-helix structure of DNA:

- (i) It is made up of two polynucleotide chains where the backbone is constituted by sugar-phosphate and the base project inside.
- (ii) The two chains run in antiparallel directions. The one chain has the polarity 5' – 3' and the other has 3' – 5'.
- (iii) The bases in two strands are paired through hydrogen bond (H – bonds). Adenine forms two hydrogen bonds with thymine from opposite strand vice-versa. Similarly, Guanine is bonded with cytosine with three H-bonds.
- (iv) The two chains are coiled in a right-handed fashion. The pitch of the helix is 3.4 nm and these are roughly ten base pairs in each turn. The distance between a bp in a helix is approximately equal to 0.34 nm.

(v) The plane of one base pair stacks over the other in double helix. Thus, in addition to H-bonds, confers stability of the helical structure.

Or

Walter Sutton and Theodor Boveri proposed the chromosome theory of inheritance. Its main features are:

- (i) Each chromosome carries several specific determiners which play an essential role in the development of an organism. A loss of complete chromosome or its fragment leads to deviation in the structure and function of an organism.
- (ii) The somatic cell of an organism bears two identical sets of chromosomes (diploid), each receiving from mother (maternal chromosome) and father (paternal chromosome). These two chromosomes of one type constitute the homologous pair.
- (iii) The paired homologous chromosome gets separated during meiosis and each gamete receives one chromosome of each homologous chromosome.
- (iv) The paired condition of both chromosomes is maintained during fertilization.
- (v) Each chromosome contains numerous genes and the position assigned to each gene is called locus. These genes help the organism to develop from the zygote.
- (vi) Each chromosome retains its individuality, uniqueness and continuity throughout the life of an organism and from generation to generation. They never get lost or mixed up but behave as units.

(Any five points)

30. (a) Water tanks, flowerpots and stagnant water.
 (b) Dengue and Malaria.
 (c) Gambusia and dragonfly.
 (d) Values:
- i. Observation
 - ii. Sensitivity towards health.