

CBSE Board
Class XII Biology
Sample Paper – 1 (Solution)

Section A

Answer 1.

The margin of green leaf of Bryophyllum has notches bearing buds. The plantlets develop from these buds in the notches and develop into independent plants when they are detached and grown on the moist ground.

Answer 2.

Lemon thorns and gourd tendrils are homologous organs because both are modified stems and both arise from the axillary bud.

Answer 3.

Pyrogens are released by WBCs in order to set the body's thermostat at a higher temperature.

Answer 4.

Plasmids and Bacteriophages.

Answer 5.

It is the sequence of base pairs that reads same on the two strands when orientation of reading is kept the same.

Answer 6.

These are more tolerant to abiotic stresses.

Answer 7.

It is obtained when the environment resistance exists in nature.

Answer 8.

It is the position or status of an organism in an ecosystem which may be filled by different species in different geographic areas.

Section B

Answer 9.

It is an aquatic plant called water hyacinth which propagate vegetatively at phenomenal rate and quickly spread all over the water body in a short span of time. It causes depletion of oxygen in the water and ultimately, resulting in death of fishes and other water animals.

Answer 10.

(a) Since the ratio of the offspring is 9:3:3:1, it reveals the law of independent assortment of genes. The genotype of the parents will be: Aa Bb and Aa Bb.

(b) Since the ratio of the offspring is 1:1:1:1, it exhibits the ratio of test cross where one of the parents will be recessive. So, the genotype of the parents will be: AaBb \times aa bb

Answer 11.

(a) The complementary bases of DNA strand will be: GTA, ATC, ATG, CTG.

(b) The complementary bases of RNA strand will be: GUA, AUC, AUG, CUG

Answer 12.

During DNA fingerprinting, the fragments of DNA are separated by electrophoresis and then separated DNA sequences are transferred to a nylon or nitrocellulose sheet placed over the gel. This is called southern blotting.

This technique is applied in DNA fingerprinting.

Answer 13.

Restriction enzymes: These enzymes are nucleases which cut DNA into short pieces containing identifiable genes at specific sites. These pieces are then introduced into plasmids, yeasts or plant cells.

Topoisomerase: These enzymes break and reseal strands of DNA which serve as starting points for replication.

Answer 14.

The insecticidal protein (Bt toxin) exists as inactive protoxins but once an insect ingests the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilises the crystals of protein. Thus, this toxin does not kill the Bacillus.

Answer 15.

Grazing Food Chain	Detritus Food Chain
(i) First trophic level organisms are detritivores and decomposers. (ii) It is based on energy from the sun.	(i) First trophic level organisms are producers. (ii) It is based on energy present in the detritus.

Answer 16.

Yes, these chemicals are non-biodegradable and keep accumulating at increasing concentrations as we go high in the trophic levels. They are potentially toxic and are known to exhibit significant harm. Example - high concentrations of DDT in birds cause premature breaking of their eggs reducing their population.

Answer 17.

Lichens can grow on bare rocks stimulating chemical breakdown of rocks. Mosses speed up the soil accumulation by trapping the soil blown particles. Together they form a substratum for further seed settlement and germination.

Answer 18.

Infective stage: Sporozoite.

Symptoms:

- (i) Headache and nausea.
- (ii) Chill and shivering followed by outbreak of fever. Fever is subsided with profuse sweating.

Or

RNA is the first genetic material. All the essential life processes like metabolism, translation, splicing, etc. evolve around RNA. RNA is used to act as a genetic material as well as catalyst. RNA being a catalyst is reactive but unstable.

Section C

Answer 19.

In majority of plants, the male gamete is motile and the female is stationary. So, the male gamete is transferred to the female gamete through various agencies like water, wind, insects, birds and bats, etc. In several simple plants like algae, bryophytes and pteridophytes, water is the medium through which this gamete transfer takes place. Similarly, in maize, date palm and coconut, the transfer of gametes is through wind.

In bisexual, self-fertilizing plants e.g. peas, transfer of pollen grains to the stigma is relatively easy as anthers and stigma is located close to each other. Pollen grains soon after they are shed, come in contact with the stigma. But in dioecious plants, the external agents are required for the transfer of gametes and the male gametes are produced in large number to compensate the wastage occurred during the transport.

Answer 20.

Spermatocytes and Oocytes:

Spermatocytes	Oocytes
(i) These are formed when the spermatogonia in the seminiferous tubules of testes divide mitotically. Each spermatogonia undergo mitosis and forms two primary spermatocytes.	(i) These are formed in the Graafian follicles of the ovary. Each maturing Graafian follicle contains diploid primary oocyte at its centre.
(ii) Each primary spermatocyte undergoes meiosis - I and forms the two haploid secondary spermatocytes.	(ii) Each primary oocyte undergoes meiosis I and forms two haploid cells - secondary oocyte and small polar body.
(iii) The secondary spermatocytes undergo meiosis -II and form haploid spermatids.	(iii) The secondary oocyte undergoes meiosis II and form one ovum and polar body.

Answer 21.

- (a) Selection of more resistant varieties of pests.
- (b) This phenomenon is called evolution by anthropogenic action.
- (c) Evolution does not have a fixed directionality and is a chance event.

Answer 22.

- (a) Genes on the same chromosomes were closely associated and are called linked genes. He discovered the process of linkage. The genes could be far apart.
- (b) When genes are linked, % of parental combination is higher than recombinants.
- (c) When genes are not linked or loosely linked or far apart, % of parental combination is less than the recombinants.

Answer 23.

Symptoms of drug addicts:

- (i) Drowsiness, disturbances in sleep, pale looking eyes, irritation and undue excitement.
- (ii) Lack of interest in studies and work, increasing demand for money and socially inactive.
- (iii) Loss of weight and appetite, poor memory, weakness and always look tired.

Answer 24.

Significance of SCP:

- (i) SCP is rich in high quality protein and is rather poor in fats, hence it is a valuable supplement in human diet. Its use bridges the gap between the requirement and supply of proteins in human diet.
- (ii) It reduces the pressure on agricultural production systems for the supply of required proteins.
- (iii) SCP production based on industrial effluents helps in reducing environmental pollution.

Answer 25.

Restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites but between the same two bases on opposite strands. This leaves single stranded portions at the ends. These are overhanging stretches called sticky ends on each strand. These are named so because they form hydrogen bonds with their complementary cut counterparts. This stickiness of the ends facilitates the action of the enzymes DNA ligase.

Answer 26.

Plants and animals are interdependent upon each other for reproduction. The insects are flower specific and have structures suitable for nectar sucking and pollination. On the other hand, flowers may also be insect specific. For example, snapdragon flower has lip-like petals to facilitate insect entry and landing. Both flowers and insects have developed and evolved in a way leading to their independence. Flowers offer nectar to insects as a reward for pollination.

Answer 27.

Seral	Climax
(i) The species composition at the seral stage is determined by the habitat conditions.	(i) The species composition at the climax stage is determined by the regional climate, local conditions, soil, topography and water availability.
(ii) Size of individuals remains small.	(ii) Size of individuals remains large.
(iii) Ecological niches are few and generalized.	(iii) Ecological niches are many and specialized.

Or

The various techniques used in control of gaseous pollutants are:

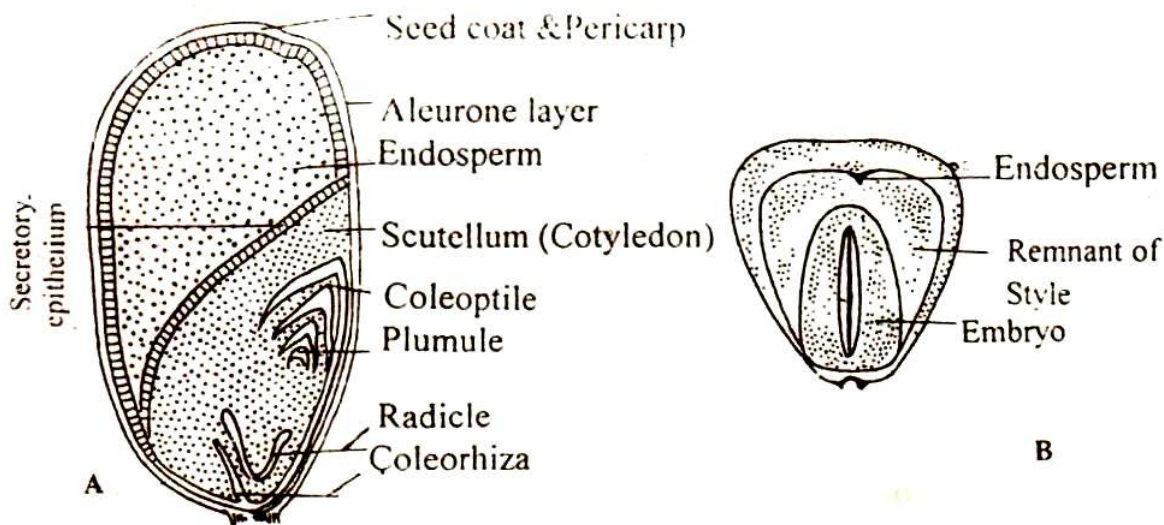
- (i) Combustion: In this process, oxidisable gaseous pollutants are completely burnt at a high temperature. Petro-chemical, fertilizer, paints and varnish industries use combustion control of gaseous pollutants.
- (ii) Absorption: In this technique, gaseous pollutants are absorbed in suitable absorbent material.
- (iii) Adsorption: This technique is applied to control toxic gases, vapours and inflammable compounds that could not be efficiently removed or transferred by the aforesaid techniques. Such air pollutants are adsorbed on large solid surfaces.

Section D

Answer 28.

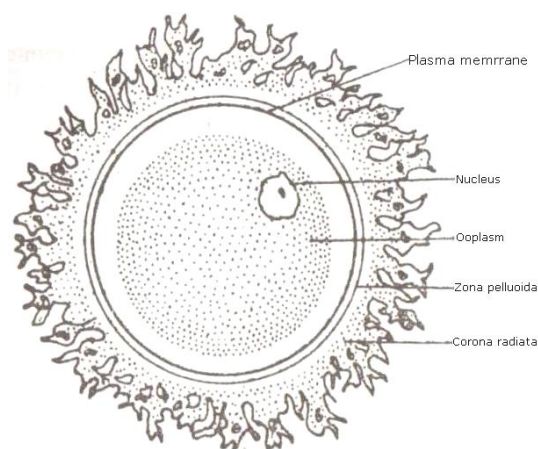
The structure of monocotyledonous albuminous seed:

- (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

The human ovum is a rounded haploid structure that lacks the yolk (alecithal). It is non-motile containing eccentric located nucleus with bulk of cytoplasm. The nucleus of an ovum is called germinal vesicle and it contains a prominent nucleolus. The cytoplasm is called as ooplasm and is surrounded by vitelline membrane and again by transparent, thick and non-cellular layer, zona pellucida. The vitelline membrane is a very thin and transparent and there lies narrow previtelline space between vitelline membrane and zona pellucida. Outside the zona pellucida, there is a thick coat of radially elongated follicle cells and is called as cellular corona radiata. These follicle cells glued together by hyaluronic acid (a mucopolysaccharide) which acts as a barrier for the entry of sperms. The ovum has a polarity and the side of ovum that extrudes the polar bodies and has nucleus is called animal pole. The opposite side is called as vegetal pole.



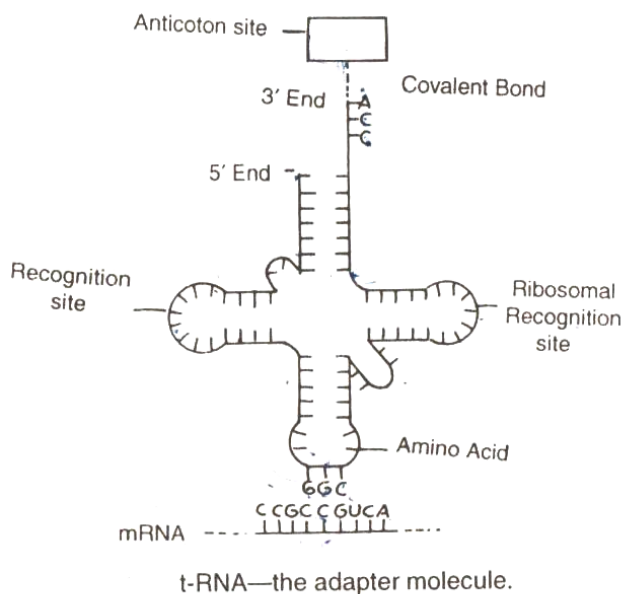
Answer 29.

- (i) Euploidy will occur. Wheat is an example of polyploidy (hexaploid) with 42 chromosomes (6 times multiple of normal haploid, $N = 7$).
- (ii) Aneuploidy will occur. It may be trisomic when diploid organism bears one chromosome extra ($2N + 1$) or a monosomic when the diploid has the loss of one chromosome ($2N - 1$). Down's syndrome is best known example of aneuploidy.
- (iii) Deletion. Cri-du chat syndrome.
- (iv) Translocation will occur. In certain leukemia, such as chronic myeloid leukemia (CML), the malignant cells have the chromosome 22 shortened due to translocation of a piece of its long arm.
- (v) Inversion will occur. It produces unbalanced meiotic products, thus leading to sterility.

Or

Structure of Transfer RNA

- (i) It is soluble RNA and constitutes about 10 – 12% of the total RNA in the cell cytoplasm. It has four main sites:
- (ii) Amino acid binding site (tail): The 3' end of the molecule carries specific amino acid with CCA base sequence having –OH at the tip, This site is responsible for the attachment of activated amino acid with its free –OH group and COOH of the amino acid.
- (iii) Recognition site or dihydrouridine loop (DHU): It contains specific base sequence and charging enzymes that catalyzes the attachment of correct amino acid to the t-RNA molecule.
- (iv) Anti-conda site: It contains three unpaired ribonucleotides complementary with the codon on m-RNA. It determines the correct pairing of t-RNA with the specific condon on mRNA.
- (v) Ribosome recognition site (T ψ C): It is meant for binding the t-RNA with the ribosome. It is made up of seven nucleotides and is overlapped on the DHU loop, thus t-RNA appears L-shaped in a 3-D structure.



Answer 30.

- (i) MOET (Multiple Ovulation Embryo Transfer) as success rate of this technique is more.
- (ii) Cow is administered hormones, with FSH like activity, to induce follicular maturation and super ovulation-(6-8 eggs). The animal is mated. Fertilized eggs are recovered and transferred to surrogate mother.
- (iii) Advantages of MOET:
 - a. Herd size is increased in short time.
 - b. Genetic mother is available for another round of super ovulation.
- (iv) Values:
 - a. Critical thinking
 - b. Problem solving.