CBSE Board

Class XII Biology

Sample Paper – 10 (Solution)

Section A

Answer 1.
Seeds contain minimum quantity of water and can remain dormant for long period.

Answer 2.
Saliva of cow contains lysozyme which kills harmful bacteria.

Answer 3.
They are analogous because both perform the process of excretion.

Answer 4.
It is used for vectorless direct gene transfer.

Answer 5.
It is unauthorized use of bioresources and traditional knowledge related to bioresources for commercial benefits.

Answer 6.
Bioreactors are used to produce vaccines, enzymes, hormones and monoclonal antibodies on large scale cell cultures.

Answer 7.
The assemblage of pioneer species is called pioneer community.

Answer 8.
Bacteria and fungi.

Section B

Answer 9.
Parturition is the process of expulsion of foetus from the uterus. Oxytocin, cortisol and estrogens are involved in the induction of parturition.

Answer 10.

The male Drosophila is referred as heterogametic because it produces two types of gametes - one containing X sex chromosome (X + 3) and other Y sex chromosome (Y + 3).

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.
(i) The oxidizing earth's atmosphere then would have prevented the abiotic synthesis of organic molecules and ultimately life.
(ii) The presence of oxygen then would have destroyed various intermediate products formed during abiotic synthesis.

Answer 13.
Applications of genetic engineering:
(i) It has helped to understand the nature and function of the hereditary material.
(ii) This technology has helped in detecting various abnormalities in individuals as well as has improved the human races by removing the defective genes.

Answer 14.

Transgenic Crops Technique	Normal Breeding Activities
(i) In this technique, any gene can be used for transfer.	(i) In normal breeding, only those genes can be used that are present in such species that can be hybridized with them.
(ii) Change in genotype can be controlled.	(ii) Changes cannot be controlled and occur in all those traits for which the parents used in hybridization differ from each other.

Answer 15.
Importance of carbon cycle in nature:

(i) It helps in maintaining CO_2 level constant in the atmosphere.
(ii) It helps in maintaining proper temperature on the earth through the green house effect.

Answer 16.
Genetic diversity reflects that if a species has more genetic diversity, it can adapt better to the changed environmental conditions. Lower diversity in a species leads to uniformity, as is the case with large monocultures of genetically similar crop plants. Secondly, the genetic diversity within a species often increases with environmental variability.

Answer 17.
Radioactive wastes from atomic plants are discharged into rivers or streams and affect the aquatic plants and animals to a very great extent. These radioactive wastes enter the food chain and result in their biomagnification. They cause ionization of various body fluids and kill the members of food chain. So, ultimately disturb the ecological balance in nature.

Answer 18.
Once a person starts taking alcohol or drugs, he becomes addict to these substances physically and mentally. Whenever he tries to get rid of this habit, he shows unpleasant 'withdrawal symptoms' which includes vomiting, diarrhea, shivering, twitching, perspiration, abdominal and muscular cramps etc. So, it becomes difficult for a person to get rid of this habit.

Or

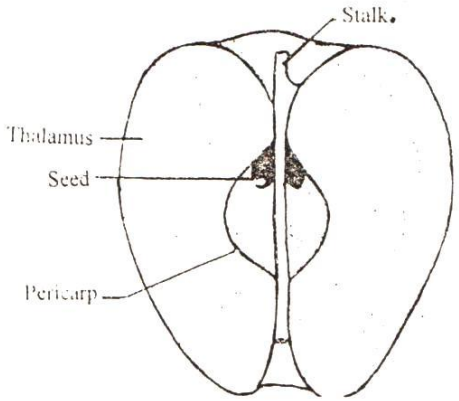
When inbreeding depression becomes a problem, selected animals of the breeding population should be mated with unrelated superior animals of the same breed. This helps to restore fertility and yield.

Section C

Answer 19.

The period for which pollen grains remain viable is highly variable and depends on the prevailing temperature and humidity. In some species of cereals such as rice and wheat, pollen grains lose viability within 30 minutes but in families like Rosaceae, leguminoseae, they maintain viability for months. But pollen grains of large number of species can be stored for years in liquid nitrogen which can be used as pollen banks.

Answer 20.



A false fruit (apple).

Answer 21.

Down's syndrome	Turner's syndrome
(i) It is an autosomal abnormality. (ii) It bears 47 chromosomes instead of 46. (iii) It is trisomy of 21 chromosomes.	(i) It is sex chromosomal abnormality. (ii) It bears 45 chromosomes instead of 46. (iii) It is monosomy of XO type.

Answer 22.

(i) AUG is a codon.
(ii) It stands for methionine amino acid.
(iii) It serves as initiating codon for the synthesis of polypeptide chain.

Answer 23.

Antigen	Antibody
(i) It is a substance which induces an immune response when introduced into an organism.	(i) It is a plasma protein that is produced in response to the entry of antigen in the body.
(ii) It is a large molecule of protein or polysaccharide.	(ii) It is a plasma protein.
(iii) It is found on the cell walls of bacteria or on the coats of viruses.	(iii) It circulates in the body fluids and fights against antigens to neutralize their effects.

(i)

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.

The various steps involved in plant genetic engineering are:

(i) Identification and isolation of agronomically important gene.

(ii) Cloning the isolated gene in a plant transformation vector.

(iii) Introduction of the gene into plant protoplasts, cells or tissues using gene transfer methods.

(iv) Culture and regeneration of complete plants from genetically transformed cells on suitable selection medium.

(v) Demonstration of the integration and expression of foreign gene in the transgenic plants by using molecular technique.

Answer 26.

The desert animals have the ability to concentrate their urine so that minimal volume of water is used to remove excretory products. The Kangaroo rat in North America deserts is capable of meeting all its water requirements through its internal fat oxidation in which water is a by-product. Some desert animals like camel can store water in its body and uses it at the time of need. The desert animals like rat, snake, etc. have the ability to hide under the earth to escape the scorching heat.

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.

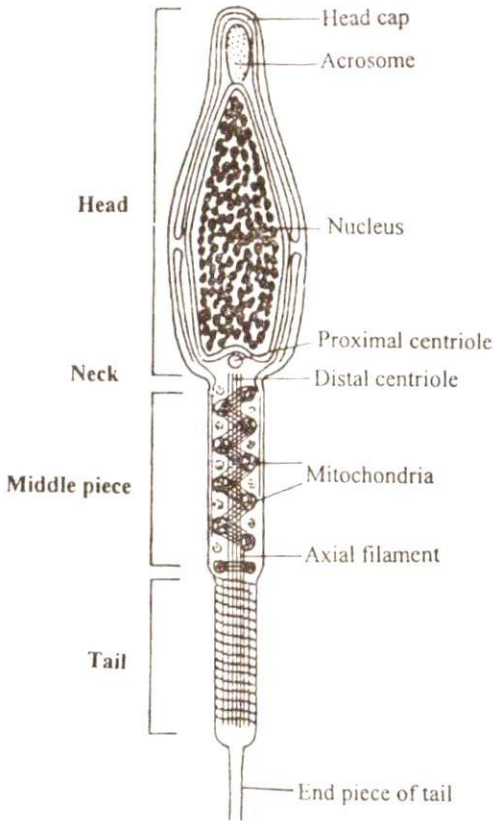
Section D

Answer 28.

The human sperm is a microscopic, long, flagellated and haploid motile cell and is formed of head, neck, middle piece and tail.

(i) Head: It constitutes the anterior region of sperm containing nucleus and acrosome. The nucleus is a narrow, flat and oval structure consisting of densely packed nuclear chromatin material. The later is formed of DNA and nucleo-protein. A small pointed sheathy acrosome is found at the anterior region of head and is derived from the golgi bodies. It contains hydrolytic enzyme-hyalurinidase which helps the sperm to penetrate into ovum during fertilization by dispersing the cells of corona radiata.

(ii) Neck: It is very short or indistinguishable region lying in between head and middle piece. It contains the proximal and distal centriole with 9 + 0 arrangement of microtubules. The proximal centriole forms the spindle in the first cleavage division of the fertilized ovum. The distal centriole gives rise to many fine micro-tubules which run up to sperm tail by passing through middle piece.



(iii) Middle piece: It is a cylindrical region lying behind the neck. It contains number of mitochondrial spiral (nebenkern) which encircles the axial filament arising from distal centriole. The mitochondrial spiral contains the oxidative enzymes which provide energy for movement of sperm by the process called oxidative phosphorylation.

(iv) Tail: It is the longest part of the sperm and is formed of main central-axial filament and the outer protoplasmic sheath with small amount of cytoplasm. At the posterior end of tail, the axial filament is naked without any sheath and is called as end piece. The tail undulates rapidly and provides mobility to the sperm with the head forward in the fluid medium.

Or

Characteristics of birds pollinated flowers (Ornithophily):

(i) Flowers produce abundant of nectar.

(ii) The flowers are usually bright coloured-red, yellow, orange or blue to attract birds from long distances.

(iii) Some bird pollinated flowers have funnel shaped corollas.

(iv) The floral parts are commonly feathery.

(v) Scent is often absent:
Examples - Bombax (Red silk Cotton), coral tree and bottle brush.

Answer 29.

Process of Transcription:

(i) Transcription: It is the formation of m-RNA strand on a DNA strand in the nucleus. The mechanism of m-RNA synthesis is analogous to DNA replication where only one of the two strands (sense strand) acts as a template. The formation of m-RNA takes places in 5' – 3' direction so the sequence of nucleotides on DNA template (sense strand) must be in 3' – 5' orientation.

(ii) This process involves unwinding of DNA and transcription starts at a specific point called as promotor region. DNA-dependent RNA polymerase enzyme binds to the 'Pribnow box' at the promotor region and starts the transcription process. RNA-polymerase enzyme contains a detachable sub-unit called the sigma (σ) factor. It helps the enzyme to bind firmly to the DNA. The RNA core polymerase (minus sigma factor) moves down the DNA at a faster pace and this continues to synthesize new RNA chain. It requires the building block of uracil (U), adenine (A), cytosine (C) and guanine (G). The base sequence in DNA decides the base sequence in m-RNA as A pairs with U and G pairs with C. The m-RNA is synthesized on DNA template in 5' – 3' direction and so successive nucleotides are attached at 3' –OH end of the growing m-RNA strand. So, the information of DNA coded in the sequence of base of cisteron is transcribed to m-RNA. This process remains continued until it reaches the terminator sequence in the sense DNA strand (3' AAAAAAT – 5'). At this point, another protein particle, the rho (ρ) factor forms a complex with RNA-polymerase. This cause the enzyme to go off the DNA track and thus, new m-RNA is released. Many m-RNA are synthesized in rapid succession along a cisteron. The completed m-RNA moves away from the nucleus and binds to a group of ribosomes in the cytoplasm.

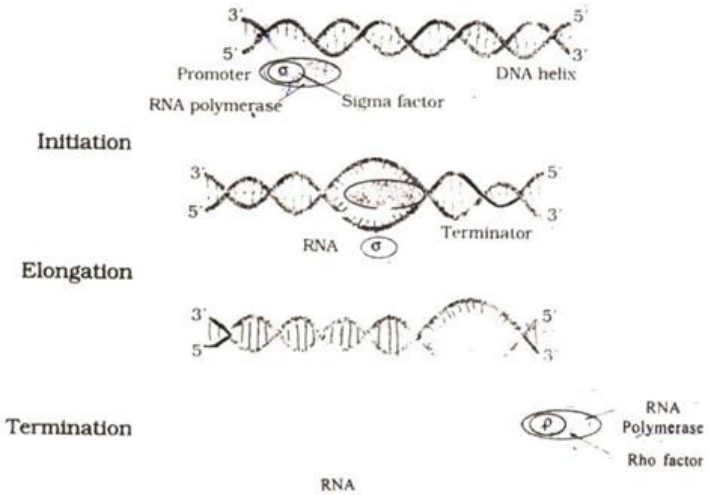


Diagram showing the mechanism of transcription.

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 homologues 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 of life of an organism and from generation to generation. They never get lost or mixed up but behave as units.

(Any five points)

Answer 30.

(a) He fells energetic because nicotine raises blood pressure and increases heart beat. This is not good for his health.

(b) CO binds to haemoglobin and reduces concentration of oxygen.

(c) Other ill effects include cancer of lungs, throat, and emphysema.

(d) Values:

i. Awareness about health

ii. Consciousness.

iii. Critical thinking.