CBSE Board

Class XII Biology

Sample Paper – 2 (Solution)

Section A

Answer 1.
Banana is an underground modified stem (rhizome). It is prostate and swelling stem that grows horizontally under the soil.
It is recognized by its well marked nodes and internodes. The adventitious roots arise from the lower side.

Answer 2.
Miller and Urey took methane, hydrogen, ammonia and water vapours in their experiment.

Answer 3.
It is a definite and orderly sequence of community change in an area.

Answer 4.
It is the capacity of organisms to blend with the surroundings.

Answer 5.
Recombinant proteins.

Answer 6.
It is used to separate the fragments of DNA.

Answer 7.
It is the extra genetic material in bacteria that can be taken out or injected back. It is self-replicating and carries the genes for sex factor or fertility factor.

Answer 8.
Spleen and tonsils.

Section B

Answer 9.
Syngamy is the fusion of male and female gametes. It results in the formation of a diploid zygote.
The term syngamy means 'fusion of gametes' and describes the event that occurs when two gametes of opposite sexes come close to each other and fuse. However, the term fertilization encompasses all the associated events that ultimately lead to syngamy.

Answer 10.
(a) The genotype at F1 level will Bb. (B-Black, b-white) The genotype at F2 level will be: BB, Bb, Bb, bb
(b) Since white is a recessive character so on mating two F2 whites, the offspring will be all white.

Answer 11.
Parents ... Tall and Red X Dwarf and White
Genes ... TtRr X ttrr
Gametes ... TR, Tr, tR, tr X tr
These gametes fuse as follows:

	TR	Tr	tR	tr
tr	TtRr (Tall plant with red flowers)	Ttrr (Tall plant with white flowers)	ttRr (Dwarf plant with red flowers)	Ttrr (Dwarf plant with white flowers)

Result: 1:1:1:1

Answer 12.

Nucleoside	**Nucleotide**
(i) It is the combination of a nitrogenous base and a pentose sugar. (ii) It is slightly basic in nature.	(i) It is the combination of a nitrogenous base with pentose sugar and phosphate. (ii) It is slightly acidic in nature.

Answer 13.
Pyramid represents relation of subsequent trophic levels in terms of quantity expressed as either number, or biomass or energy. The number of biomass may either decrease or increase, energy at the lower trophic level is always more than at higher trophic level.

Answer 14.
Natural conversion of lakes to land takes thousands of years. Human activities have speeded the aging converting water bodies to land at alarming high rates, along with interfering with the lake ecosystem, harming it and causing loss of species diversity.

Answer 15.
(a) High growth due to surplus food and space.
(b) "b" is more realistic because at increasing number of individuals in a population, there is restricted growth due to competition, predation, etc.

Answer 16.
(i) Discovery of restriction enzymes: These enzymes cut DNA into short pieces containing identifiable genes at specific sites. For example, Eco RI cut DNA at the sequence GAATTC/CTTAAG in double helical DNA.
(ii) Development of techniques in order to get new DNA fragments using phages and plasmid etc.

Answer 17.
Any alien piece of DNA which has to become the part of a chromosome should have the ability to replicate. For initiating replication, a chromosome has a specific DNA sequence (origin of replication) and for the multiplication of any alien DNA, it needs to be a part of chromosome. Thus, an alien DNA is linked with the origin of replication so that alien DNA can replicate and multiply itself in the host organism. This is called as cloning.

Answer 18.

Causes of fever:

(i) WBC count of blood increases during inflammation. It generates heat which results in fever.

(ii) Pyrogens or the toxins released by pathogens also generate fever.

Or

Symptoms of AIDS:

(i) Swollen lymph nodes and fever.

(ii) Sweating at night and weight loss.

Section C

Answer 19.

Significance of Parthenogenesis:

(i) It helps in determining the sex of an animal as in honey bee.

(ii) It overcomes the wastage of energy spent upon the process of mating and fertilization by an animal.

(iii) It rapidly increases the number of animals in a population.

Answer 20.

Ovulation: It is the process of release of mature ovum from the ovary in the abdominal cavity. After ovulation, the anterior pituitary gland stops producing FSH but continues to secrete LH, which causes the transformation of ruptured Graafian follicles into corpus luteum. The corpus luteum secretes progesterone. The uterine glands become complicated, active and more cork screw shaped for the implantation of the fertilized ovum. If there is no fertilization, then corpus luteum undergoes degeneration and progesterone secretion declines leading to fresh start of menstruation cycle.

Answer 21.

Parent ... Purple × White

↓

F_1 generation ... 40 plants with purple flowers

↓

On selfing (F_1 × F_1)

↓

F_2 generation ... 470 (Purple) : 162 (White)

In F_1 generation, only purple flower producing plants appeared. This means purple colour is dominant which does not allow the white colour to express itself. In F_2 generation, purple and white coloured flowers were produced in the ratio of 3 : 1. Here, the parental character of white again reappeared in about one-fourth of the progeny. This occurs due to segregation of genes in the gamete formation. This represents the law of segregation and monohybrid ratio.

Answer 22.

Lactose acts as an inducer in lac operon. The induce lactose binds to the repressor and forms the complex that remains unable to bind the operator. The RNA polymerase enzyme now becomes free to join with promoter and so the operator comes in switched on position. This initiates the transcription of the structural genes, producing the three polypeptides (enzymes). These enzymes bring about the metabolism of lactose into glucose and galactose.

Answer 23.

The genetic modification has:

(i) Made crops more tolerant to abiotic stresses.
(ii) Reduced dependency on chemical pesticides.
(iii) Helped to reduce post harvest losses.

Answer 24.
Pathogen: Filarial worm (*Wuchereria bancrofti*)
Vector: Culex sp. of female mosquito.
Symptoms:

(i) In acute cases, filarial infection causes fever.
(ii) Pathogen blocks the lymphatic system and lymph accumulates in other parts of the body, resulting in enlargement of these body parts.

Answer 25.
No restriction endonucleases enzymes are present in eukaryotic cell. All the restriction endonucleases have been isolated from the various strains of bacteria and they are also named accordingly to the genus, species of prokaryotes. The first letter of the enzyme comes from the genus and the second two letters come from the species of the prokaryotic cell from which they were isolated. For example, Eco RI comes from Escherichia coli RY 13. In Eco RI, the letter 'R' is derived from the name of strain. Roman numbers following the names indicate the order in which the enzymes were isolated from that strain of bacteria.

Answer 26.
Red algae have a phycoerythrin, phycocyanin and chlorophyll-a pigments which make them to grow successfully in the deep seas. The blue-green region of light can only penetrate the deep-sea and the red algae have the capacity to absorb this light for photosynthesis due to the presence of red pigment (phycoerythrin). The other photosynthetic forms cannot survive in the deep sea because they cannot absorb blue-green light in the absence of phycoerythrin.

Answer 27.
(i) The urbanization and increase in population has forced the man to clear the forests and kill more wild life in order to meet the demand of food and space. These activities is turn have disturbed the food chain and food web of the forest and have caused soil erosion, floods, droughts and change in physical environment.
(ii) It has created the problem of energy crisis. The rate of consumption of non-renewable resources is enhancing with increasing population. If this rate of consumption continues, then there will be a depletion of non-renewable resources.
(iii) Due to increase in population, number of vehicles and other sound articles, the noise pollution is increasing day by day in the urbanized cities. Constant exposure to these noises is producing deafness, increase in nervous tension and blood pressure and heart troubles.

Or

Effects of noise pollution:

(i) Constant exposure to sound produces deafness, increase in nervous tension and blood pressure.

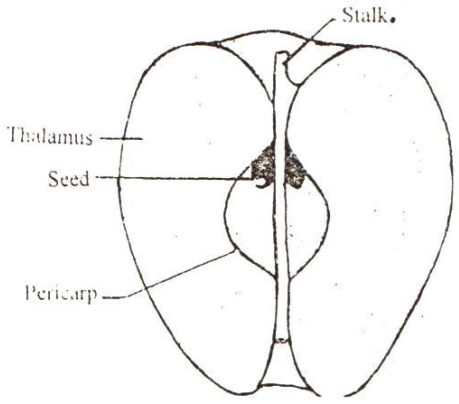
(ii) It causes headache, irritability and affects the sensory and nervous system.

(iii) It causes emotional disturbances.

Section D

Answer 28.

V.S. of apple:



A false fruit (apple).

Biological importance of fruits:

(i) Fruits form a protective covering around the seeds against adverse climatic conditions and animals.

(ii) Fruits on maturity become coloured, sweet and flavoured to attract the seed-dispersing agents for disposal to distant localities through wind, water and animals.

(iii) The immature fruits are bitter and possess unpalatable and repelling substances like tannins and bitter alkaloids etc. to provide chemical defence against animals.

(iv) The colours of many young fruits resemble with the green leaves and so they are not easily spotted by the animals.

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.

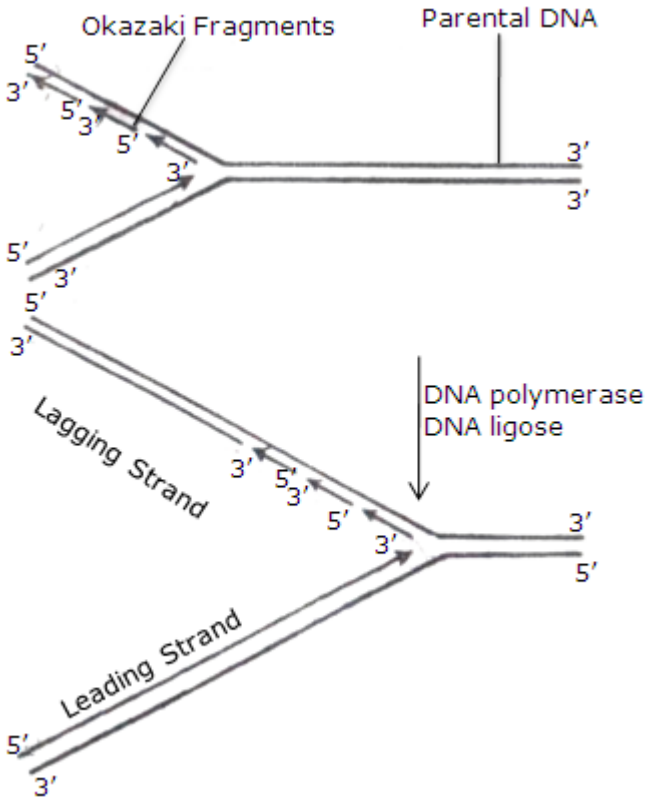
(ii) Prostate Gland: It is the largest auxiliary gland with chestnut like shape situated around the 1st part of the urethra below the urinary bladder. It is surrounded by a thin and dense capsule of fibrous connective tissue and muscle fibres which provides firm palpation to it. It secretes milky, thin 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.

Answer 29.

(i) Origin or replication: 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 merge together during the process of replication.

(ii)Unwinding of two DNA strands: It takes place in the presence of enzymes – helicases which unwind helix and enzymes topoisomerases that break and reseal one strand of DNA. The unwinding of DNA leads' to the formation of Y-shaped structure to the two strands of DNA duplex. This is known as replication fork.



(iii) Synthesis of primer: It is a stretch of RNA formed on the DNA where synthesis of new DNA starts. The DNA directed RNA polymerase synthesizes the primer strands of RNA directed RNA polymerase synthesizes the primer strands of RNA (RNA primer) for leading and lagging strands. New strands grow from the fork and as replication proceeds, it appears as if the point of divergence at the fork is moving.

(iv) Synthesis of leading (Continuous) strand: The synthesis of continuous strand (new) of DNA is formed in the 5' – 3' direction on the 3' -5' DNA template due to addition of deoxyribonucleotides at the 3' end of primer RNA. This process occurs in the presence of enzyme – DNA polymerase and ATP. Since one new strand is formed in a continuous stretch in the 5' -3' directions and this is referred as leading strand.

(v) Formation of lagging (discontinuous stand): In the second parental strand, the enzyme primase forms the RNA primer. The enzyme DNA polymerase synthesizes the DNA in

the form of short stretches once again in the 5' – 3- direction starting from a RNA primer. These DNA short segments, consisting of numerous nucleotides, are referred to as okazaki fragments. The okazaki short segments are joined together by the enzyme-DNS ligase. It is referred to as logging strand.

This newly synthesized second DNA strand is called as lagging strand because it is formed later on in reference to first continuous strand.

Or

The full names of the different types of RNA are: (i) r-RNA (Ribosomal RNA), (ii) m-RNA (Messenger RNA) and (iii) t-RNA(Transfer RNA). T-RNA has clover leaf structure in two dimensions:

(i) r-RNA: It forms about 80% of the total cellular RNA and is a component of the ribosomes. It is a single stranded molecule but twisted on itself.
Role: It serves to release m-RNA from DNA. The ribosomal proteins and the r-RNA form the functional units of ribosomes during protein synthesis.

(ii) m-RNA: It is formed by DNA template in the nucleus and moves to the cytoplasm within two subunits of ribosomes. It is a complementary strand to one of the DNA strands formed during transcription. It forms about 5 – 10% of the total RNA in a cell. Its length is almost equivalent to the length of protein to be synthesized in the cytoplasm. It has cap structure as 5' end and poly A tail at the 3' end.
Role: It carries codons which serve as a message tape to be decoded into a protein (amino acids).

(iii) t-RNA: It is smallest of all the RNA with molecular weight ranging from 25 to 30 thousand Daltons. It is soluble RNA and constitutes about 10 – 12% of total RNA in a cell cytoplasm.
Role: It picks up activated amino acid from the cytoplasm and supplies it to m-RNA in ribosome according to the message expressed in the form of codon. Each amino acid bears recognition site, anti-codon site, ribosome attachment site and amino acid attachment site.

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 hemoglobin and reduces concentration of oxygen.
(c) Other ill effects include cancer of lung, throat, and emphysema.
(d) Values:
  (i) Awareness about health.
  (ii) Consciousness.
  (iii) Critical thinking.