CBSE Board

Class XII Biology

Sample Paper – 6 (Solution)

Section A

Answer 1.
Endosperm with 27, embryo with 18.

Answer 2.
Klinefelter's syndrome.

Answer 3.
Beer is produced without distillation while whiskey is produced after distillation; hence it is more concentrated and pure.

Answer 4.
Plasmids and Bacteriophages.

Answer 5.
Recombinant proteins.

Answer 6.
Insulin from animal sources used to cause allergy and reactions in human beings so it was genetically engineered in bacteria.

Answer 7.
Frog (prey) is eaten by a snake (predator).

Answer 8.
Temperature and humidity.

Section B

Answer 9.

Testes remain suspended in scrotum the abdominal cavity in order to maintain their temperature 2o C to 3oC lower than that of the body. This lower temperature is essential to maintain the viability of sperms. Otherwise, it leads to sterility of sperms at body temperature.

Answer 10.

Genotype	Phenotype
(i) It is the total genetic constitution of an individual.	(i) It is the external appearance of an individual.
(ii) It is the expression of genome or more specifically the alleles present at one locus.	(ii) It is the expression of genotype produced under the influence of an environment.

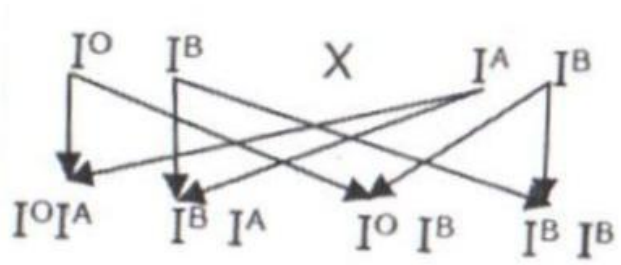
Answer 11.

(a) Base pairing of nitrogen bases is based on their chemical compatibility with respect to bonding, as well as minimum distance for H-bond formation.

(b) Purine is a double ringed structure and pyrimidine is a single ringed structure, a purine-pyrimidine pairing generates approximately uniform distance between the two strands of the helix.

Answer 12.

25%.



The sex specific blood grouping cannot be predicted as blood group is an autosomal trait.

Answer 13.
Advantages of Stirred bioreactors over shake flasks:

(i) They have better temperature and pH control system.
(ii) They have foam control system for prevention of foaming and shearing damage to cells due to agitation.
(iii) They have the system sterilization.
(iv) They have the provision to withdraw small volume of the culture periodically.

Answer 14.
Gene transfer in animals is done through direct methods such as electroporation or micro injection or using particle gun.
In the formation of Dolly, the cloned sheep, fertilized egg of its mother was removed by micro needle and nucleus from an udder cell of a donor sheep was micro-injected in the egg after removing egg nucleus. The egg developed into Dolly with genes identical to its mother.

Answer 15.

There are two basic strategies:

(i) In situ (on site). This strategy emphasizes protection of total ecosystems. The in-situ approach includes protection of a group of typical ecosystems through a network of protected areas. This means the endangered species are protected in their natural habitat so that entire ecosystem is protected.
(ii) Ex-situ (off site). These conservation strategies include botanical gardens, zoos, conservation stands, gene, pollen, seed, seedling, tissue culture and DNA banks.

Answer 16.
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 17.
(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 18.
The meristem (apical and axillary) is the part of the plant which is free of virus. The meristem of the plant is removed and grown in vitro to obtain virus-free plants. The scientists have been successful in culturing meristems of banana, sugarcane and potato etc.

Or

Fish is considered as an important source of food due to following reasons:

(i) It provides income and employment to millions of fishermen and farmers, particularly in the coastal states.
(ii) Fish meal is a rich source of protein for cattle and poultry.

Section C

Answer 19.
Significance of pollen grain:

(i) Pollen grains of many species cause allergies and bronchial afflictions leading to chronic respiratory disorders, asthma, bronchitis etc.
(ii) Pollen grains are rich in nutrients and these are used as pollen tablets as food supplements in some countries.
(iii) They play an important role in sexual reproduction and results in the formation of fruits and seed.

Answer 20.
Endocrine glands that control the process of spermatogenesis are as follows:

(i) Interstitial cells or Leydig cells lie between the seminiferous tubules and secrete testosterone. It is essential for making sperms.
(ii) Interstitial cell stimulating hormone (ICSH): It is the product of the anterior lobe of the pituitary gland and identical to the hypophyseal gonadotropin, luteinising hormone (LH) and follicle-stimulating hormone (FSH). Under the control of FSH and testosterone, sertoli cells secrete an androgen binding protein (ABP) that concentrates testosterone in the seminiferous tubules. Sertoli cells also secrete another protein, called inhibin which suppresses FSH synthesis.
(iii) FSH: It acts directly on spermatogonia to stimulate sperm production. Release of LH or ICSH is, in turn, controlled by the release of hypothalamic gonadotropin releasing hormone or GnRH.
The level of testosterone is under negative-feedback control, a rising level of testosterone suppresses the release of GnRH from the hypothalamus.

Answer 21.

(i) This result is genetically explained as mechanism of incomplete dominance. When black coloured cock is bred with a white coloured hen, the F_1 hybrid (steel-blue) does not relate to either of the parents but exhibit the blending characters of two parents.

(ii) On selfing the $F_1 \times F_1$:

Parents	...	Steel blue	X	Steel blue	
Genes	...	Ss	X	Ss	
Gametes	...	S s	X	S s	

	S	s
S	SS Black	Ss Steel-blue
s	Ss Steel-blue	ss White

Result: Black = 1; Steel blue = 2; White = 1

Answer 22.

During DNA replication, the new nucleotides are arranged in a highly accurate manner as per base-pairing rule but sometimes (1 in 10,000) wrong bases (nucleotides) may be added. To overcome this, proof reading is done to remove the wrong bases before it proceeds to add new bases in the 5' -3' direction. The DNA polymerase picks up the damaged DNA strand, wrong bases, and chews off the erroneous region. The enzyme DNA Pol-I helps in lagging the gap with the correct bases. So, proof reading confirms the accuracy of base pairing in replication.

Answer 23.

Advantages of biological control over chemical control:

(i) Biological control is self-perpetuating and no manufacturing is required for the synthesis of pathogen or beneficial organism.

(ii) The beneficial organisms can seek and find out the pest.

(iii) The pests are unable to develop resistance against the pathogens of biological control.

Answer 24.
Inflammation: It is the reaction of local tissue or blood to an injury or infection. It leads to swelling of the injured area due to leakage of fluid into the tissue.
At the site of injury, histamine is released from lymphocytes which causes the vasodilatation, redness, swelling and generation of heat. This is called as inflammatory response. In systematic inflammatory response, WBCs count of the blood increase considerable in order to set the body's thermostat at a higher temperature (fever).

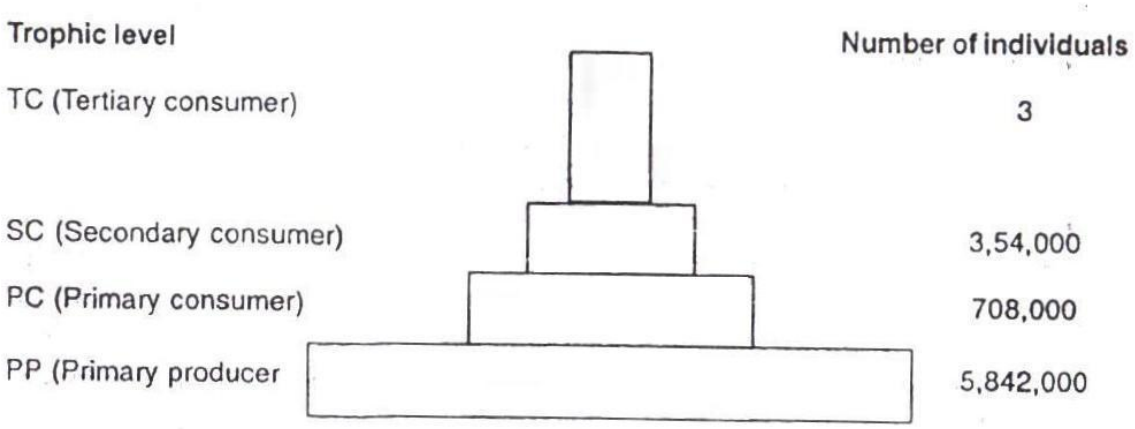
Answer 25.
Applications of Recombinant DNA Technology:

(i) This technology is used to elucidate molecular events in the biological process like cellular differentiation and ageing.
(ii) This technology is used for making gene maps and for finding complete nucleotide sequence of genome of various organisms.
(iii) In biochemical and pharmaceutical industry, the useful chemical compounds can be produced cheaply and efficiently.

Answer 26.
Many sessile animals like barnacles and molluscs living in a very cold inter tidal zones of northern shores; several insects and spiders resist the effect of cold by a process called cold hardening. These organisms have ice nucleating proteins which induce ice formation in the extra cellular spaces at very low sub zero temperature. Some freeze avoiding animals can tolerate temperature below $0^{o}C$ by accumulating glycerol or anti freeze proteins that lower freezing point of their body fluids. Due to these anti-freeze compounds, the fishes in Antarctica region remain active in the sea water.

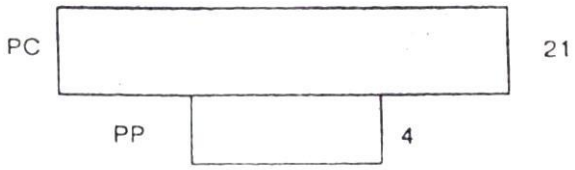
Answer 27.

Upright pyramid: In the upright pyramid, the base occupied by producers is broad as compared to subsequent consumers, which gradually narrow down at the apex.



Upright Pyramid.

Inverted pyramid: In the inverted pyramid, the base occupied by producers is short as compared to subsequent consumers which gradually broaden at the apex. This gives the shape of inverted pyramid.



Or

Ectoparasite means the parasite that feeds on the external surface of the host organism.

Examples:

(i) Lice are parasite on humans and ticks on dogs.

(ii) Many marine fishes are infested with ectoparasite copepods.

Section D

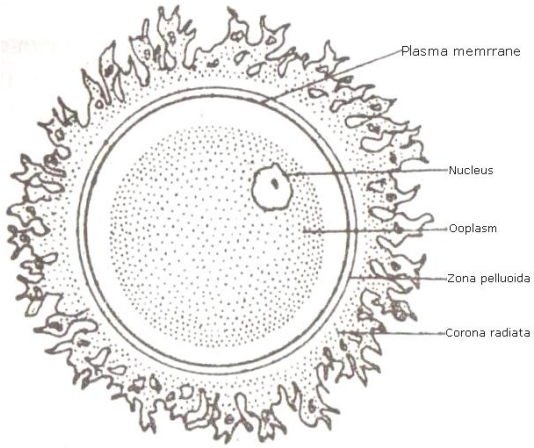
Answer 28.

Characteristics of wind pollinated flowers (Anemophily) are:

(i) Flowers are inconspicuous, odourless and not showy.
(ii) Pollen grains are produced in large quantities is a result of lot of wastage.
(iii) Pollen grains are small, smooth and dry. Sometimes, they also bear winged seeds.
(iv) Anthers are exserted.
(v) The flowers are usually unisexual.
(vi) The stigma is highly exposed and branched. They may have often feathery stigma to easily trap air-borne pollen grains.
(vii) They are devoid of nectar and edible pollens.
(viii) They may have often a single ovule in each ovary and numerous flowers are packed into an inflorescence.
(Any five points)

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 are glued together by hyaluronic acid (a mucopolysaccharide) and 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.

The Oparin-Haldane theory suggests that life came into existence as a result of chemical evolution by polymerization of simple molecules which took place on the primordial earth under the impact of certain favourable conditions. The oceans of the primitive earth contained a rich supply of these simple molecules.

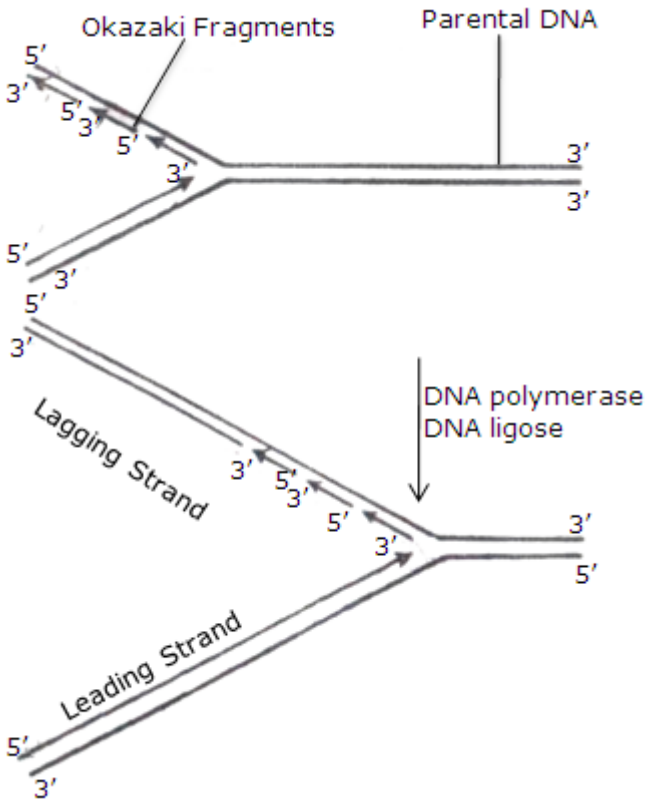
Miller and Urey actually tested the Oparin-Haldane theory and created those conditions in their experiment which were probably present on the primitive earth. They took glass tubes, flasks, condensers etc. For their experiment, they created an atmosphere containing hydrogen, ammonia, methane and water vapour in one flask and allowed the condensed water in the another flask and condenser. They passed the electric sparks from electrodes in the gaseous chamber of flaks and heated another flask containing water. They passed the mixture of these gases through the condenser. After a week, they analyzed the liquid for chemical composition inside the apparatus. They found large number of complex organic compounds such as acetic acid, urea, fatty acids and lactic acid including amino acid like glycine, alanine and aspartic acid. So, they called this process of abiotic synthesis.

Or

The mechanism of DNA replication:

(i) Origin or replication: It is the starting point where replication of DNA begins at a specific point where inter-wound 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 topisomerases 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.

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 effect includes cancer of lung, throat, and emphysema.
(d) Values:
i. Awareness about health.
ii. Consciousness.
iii. Critical thinking.