

SOLUTION MODEL QUESTION PAPER-II (TERM-II) 2021-22
CLASS-12th SUBJECT-BIOLOGY

SECTION – A

1. (i) Certain pathogens are tissue/organ specific as they are adapted to overcome the resistance mechanisms of those tissues and organs.
- (ii) Example, the pathogen that enter the gut must know a way of surviving in the stomach at low pH and resistant to various digestive enzymes. **[2 Marks]**
2. (i) Statins are bioactive molecules, produced by the yeast *Monascus purpureus*.
- (ii) It has been commercialised as blood-cholesterol lowering agents. **[1 + 1 = 2 Marks]**

OR

- (a) *Azospirillum / Azotobacter / Anabena / Nostoc / Oscillatoria / Frankia*.
- (b) Leguminous crops do not need nitrogen from soil because the nitrogen fixing bacteria (*Rhizobium*) are present in their root nodules, which can fix atmospheric nitrogen for the crops. **[1 + 1 = 2 Marks]**
3. (a) The given outline structure represents the group of drugs called cannabinoids. These groups of active compounds are found in marijuana. Marijuana refers to the dried leaves, flowers, stems, and seeds from the *Cannabis sativa* or *Cannabis indica* plant.
- (b) The most well-known among these compounds is the delta-9-tetrahydrocannabinol (49-THC), which is the main psychoactive ingredient in cannabis. Mode of consumption of cannabinoids are nasal inhalation or oral intake.
- (c) Organs affected by consumption of these drugs are heart and cardiovascular system. **[1 + ½ + ½ = 2 Marks]**
4. • Secondary waste water treatment is called as biological treatment because micro-organisms are involved in the breakdown of organic matter in this phase of waste water treatment.
- The primary effluent is passed into large aeration tanks where the organic matter in it is consumed by aerobic microbes which are later themselves. digested by anaerobic bacteria and fungi in anaerobic sludge digesters. **[1 + 1 = 2 Marks]**
5. (a) Age pyramid is defined as a graphical illustration that shows the distribution of various age groups in a population which forms the shape of a pyramid when the population is growing. The three tiers are to be labelled as
1. Pre-reproductive phase 2. Reproductive phase 3. Post-reproductive phase
- (b) The given age pyramid represents the expanding or growing type of population growth.

[1 + 1 = 2 Marks]

6. • Brood parasitism is a type of parasitism in which an organism (parasite) lays eggs on the nest.
 • Example, Cuckoo (koel) bird lays its eggs in the nest of its host and lets the host incubate them. The eggs of the parasitic bird resemble the host's egg in size and colour to reduce the chances of the host bird detecting the foreign eggs and ejecting them from the nest.

[1 + 1 = 2 Marks]

OR

- High altitude sickness (also called mountain sickness) is experienced by those people going to high altitudes. It occurs due to the decreasing amount of oxygen (low PO_2) that occurs at high altitudes.
- It is characterised by breathlessness, fast breathing, nausea, vomiting, headache, muscular weakness and mental fatigue. Symptoms begin to subside after some time.

[1 + 1 = 2 Marks]

SECTION-B

7. (i) Cancer may be defined as an abnormal and uncontrolled division of cells. Genes called cellular oncogenes (c-one) or proto-oncogenes present in normal cells when activated under certain conditions lead to oncogenic transformation of the normal cells leading to cancer.
- (ii) A cancer cell is different from the normal cell in following ways:

S.No.	Normal cell	Cancerous cell
1	Normal cells show the property of contact inhibition. Therefore, when these cells come into contact with other cells, they stop dividing.	Cancerous cells lack the property of contact inhibition. Therefore, they continue to divide, thereby forming a mass of cells or tumour.
2	They undergo differentiation after attaining a specific growth.	They do not undergo differentiation.
3	These cells remain confined at a particular location.	These cells do not remain confined at a particular location. They move into neighbouring tissues and affects its function.
4	Life spans is indefinite.	Life span is definite.

- (iii) In our body, the growth and differentiation of cells is highly controlled and regulated. The normal cells show a property called contact inhibition. The surrounding cells inhibit uncontrolled growth and division of cells. When the normal cells lose this property, it become cancerous cells giving rise to masses of cells called tumours. Transformation of normal cells into cancerous cells is induced by some physical, chemical, and biological agents (carcinogens).

[1 + 1 + 1 = 3 Marks]

OR

- Several diseases and injuries are preventable and can be managed much better if identified earlier on.
- Prevention is always better than cures because some diseases caused extensive damage to the body tissues or organs. They also have a
 - (a) negative effect on their capacity to function.
 - (b) permanent or long-term debilitating effect.
 - (c) negative mental and psychological effect.
 - (d) financial burden.

Prevention, therefore is easier and cure of a disease.

[3 Marks]

8. (i) The preventive barriers to protect the body from microbial pathogens which enter the gut of humans along with food are as follows:
- (a) **Mucus:** The mucus coating of the epithelium lining of the gut helps in trapping microbes entering the body.
 - (b) **Lysozyme:** It is present in the saliva, tears, etc. It destroys gram-positive bacterial cell walls causing cell lysis.
 - (c) **Hydrochloric acid** present in gastric juice prevent microbial growth.
- (ii) The type of immunity in the above case is innate or inborn immunity. This immunity is present from birth and are non-specific (acts on many organism). [2 + 1 = 3 Marks]
9. (i) The first letter 'H' indicates the genus of the organism from which the enzyme was isolated, H genus *Haemophilus*.
- (ii) The fourth letter 'd' specifies the particular strain which is used to produce the enzyme, d = strain Rd.
- (iii) The Roman numerals III denoted the sequence in which the restriction endonuclease enzyme from that particular genus, species and strain of bacteria have been isolated III, that is, third restriction endonuclease to be isolated from this species. [1 + 1 + 1 = 3 Marks]
10. • Paul Ehrlich proposed a hypothesis (called rivet popper hypothesis) in 1981.
- According to this hypothesis, ecosystem's function can change as the number of species increases or decreases but the direction of change is not predictable. He explained this concept by using aeroplane as ecosystem and species to thousands of rivets which are joined together in an aeroplane.
 - Besides analogy (rivet popper hypothesis) used by Paul Ehrlich for the direct relationship between diversity and stability of an ecosystem, it can be explained scientifically as follows:
 - (a) Imagine a forest area, where diverse species of plants are growing.
 - (b) Plants harbour a variety of insects on which a lot of bird species would depend for their food.
 - (c) If a specific plant species dies, the related insect population will be affected that would lead to food unavailability for the birds. In addition, if the plant species was a nitrogen fixer, the death of these plants would mean no replenishment of soil with nitrogen. This will obviously affect the other plants as well. So, if the cycle continues, the whole habitat/ecosystem will be negatively affected. [1 + 1 + 1 = 3 Marks]

11. (a) • Endemic species are those species that normally live and thrive in an ecosystem.
• Exotic species are those species that migrate into or are introduced into an ecosystem deliberately or accidentally by humans.
- (b) The expanded form of IUCN is "International Union for Conservation of Nature and Natural Resources".
- (c) In IUCN, 'Red' indicates those threatened species or species which are under various degrees of extinction or at a risk. **[1 + 1 + 1 = 3 Marks]**
12. (i) Polymerase chain reaction is a technique that is used to reproduce (amplify) selected sections of DNA or RNA for analysis. In the given figure labelled as A, B and C respectively denaturation, annealing and extension of DNA.
- (ii) In PCR, each cycle has three steps:
- (a) **Denaturation of DNA sample:** Unwinding of two strands of DNA by heating the sample at 92-94°C.
- (b) **Primer annealing:** In this primer gets position the exposed nucleotides, according to the base pairing rules.
- (c) **Extension of primers:** DNA polymerase recognises primers as 'start' tags and begins to extend the primers using the free nucleotides provided in the reaction and the genomic DNA as template. **[1 + 1 + 1 = 3 Marks]**

SECTION C

- Ans. (a) The smallest fragment which size is 1000 bp, fastly more toward the positive electrode because, the smaller the fragment size, the farther it moves fastly.
- (b) The DNA fragments separate-out, according to their size because of the sieving property of agarose gel.
- (c) The separated DNA fragments can be visualised by staining the DNA with ethidium bromide followed by exposure to UV radiation.
- (d) The separated DNA fragments are separated by elution. The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. **[1½ + 1½ + 1½ + 1½ = 5 Marks]**

OR

- (a) The main challenge for production of insulin using recombinant DNA technology was getting insulin assembled into a mature form.
- (b) (i) Insulin from an animal source, though caused some patients to develop allergy or other types of reactions to the foreign protein.
(ii) Slaughtering of animal is not ethical.
(iii) There is possibility of slaughtered animals being infested with some pathogen which may contaminate insulin.
- (c) There chains of DNA sequence corresponding to A and B chains of human insulin were prepared. They introduced them into plasmids of *E.coli* to produce separate A and B chains. The A and B chains extracted were then combined by creating disulphide bonds and form human insulin.
- (d) The insulin prepared by recombinant DNA technology does not produce sensitive allergic reactions and immunological reactions. **[1½ + 1½ + 1½ + 1½ = 5 Marks]**