Sample Question Paper - 11
Biology (044)
Class- XII, Session: 2021-22
TERM II

Time allowed : 2 hours ***Maximum marks : 35***

General Instructions :

(i) All questions are compulsory.

(ii) The question paper has three sections and 13 questions. All questions are compulsory.

(iii) Section–A has 6 questions of 2 marks each; Section–B has 6 questions of 3 marks each; and Section–C has a case-based question of 5 marks.

(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

1. Name two diseases whose spread can be controlled by the eradication of *Aedes* mosquitoes.

2. **(a)** Name any two enzymes which make bottled juices clearer than homemade fresh juice".

(b) Name the bioactive molecules produced by *Penicillium notatum* and *Trichoderma polysporum*.

OR

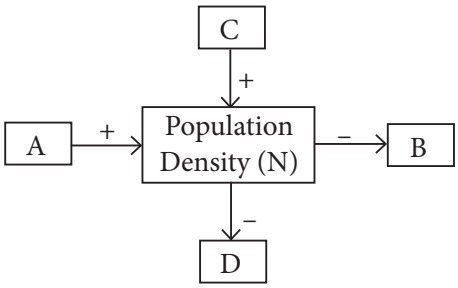
Write the source and applications of streptokinase, cyclosporin A and statin.

3. Differentiate between benign and malignant tumors.

4. How do methanogens help in producing biogas?

5. How parasitism and competition are different and similar?

6.



Study the schematic representation given above and answer the following questions.

(a) Identify A in it.

(b) Identify B in it.

(c) When population density at time 't' is N as shown above, write the population density at time 't + 1' in the form of an equation using appropriate symbols.

OR

Explain why very small animals are rarely found in polar region.

SECTION - B

7. Differentiate between active and passive immunity.

OR

What is 'withdrawal syndrome'? List any two symptoms from which it can characterised?

8. **(a)** Why is there a fear amongst the guardians that their adolescent wards may get trapped in drug/alcohol abuse?

(b) Explain 'addiction' and 'dependence' in respect of drug/alcohol abuse in youth.

9. How are 'sticky ends' formed on a DNA strand? Why are they so called?

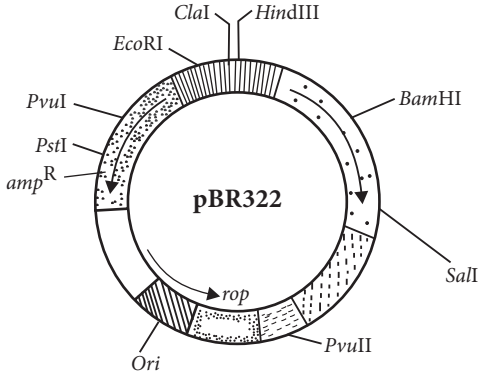
10. "More than a thousand varieties of mangoes in India are present". Mention the kind of biodiversity. How is it possible?

11. What are the two types of desirable approaches to conserve biodiversity? Explain with examples bringing out the difference between the two types.

12. How does β-galactosidase coding sequence act as a selectable marker? Why is it a preferred selectable marker to antibiotic resistance genes? Explain.

SECTION - C

13. Observe the diagram of pBR322 and answer the questions that follow:



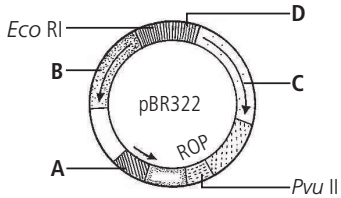
(a) What is pBR322?

(b) Write the role of '*rop*'.

(c) State the significance of amp^R and tet^R.

OR

Refer to the given figure and answer the following questions.



(a) What are the characteristics of given vector?

(b) Identify the labelled part A and give its significance.

(c) What does B, C and D represent?

(d) Name the unique recognition sites present in B and C.

Solution

BIOLOGY - 044

Class 12 - Biology

1. Chikungunya and dengue can be controlled by the eradication of *Aedes* mosquitoes.

2. **(a)** The fruit juices sold in market or bottled juices are treated with pectinases and proteases which make them clearer than those made at home.

(b) Penicillin is an antibiotic obtained from *Penicillium notatum*. It helps in curing rheumatic fever, tonsillitis, sore throat, gonorrhoea and some pneumonia types.

Statin obtained from *Monascus purpureus*, inhibits cholesterol synthesis and is therefore used in lowering blood cholesterol, *e.g.*, lovastatin, pravastatin, simvastatin.

OR

Streptokinase (Tissue Plasminogen Activator or TPA) is an enzyme obtained from cultures of some haemolytic bacterium *Streptococcus* which is modified genetically to function as clot buster. It has fibrinolytic effect hence, it helps in clearing blood clots inside the blood vessels through dissolution of intravascular fibrin. Cyclosporin A is obtained from fungus *Trichoderma polysporum* whereas statin is obtained from yeast *Monascus purpureus*.

Cyclosporin A has immunosuppressive properties. It inhibits activation of T cells and therefore prevents rejection of transplants.

Statin inhibits cholesterol synthesis and is therefore used in lowering blood cholesterol.

3. Following are the difference between benign tumor and malignant tumor:

	Benign tumor	Malignant tumor
(i)	It remains confined to the affected organ.	It spreads to other organs of the body.
(ii)	Rate of growth is usually slow.	Rate of growth is usually rapid.
(iii)	It causes limited damage to the body.	The cancer cells migrate to other sites of the body and start a new tumor there. This property is called metastasis.
(iv)	It is non-cancerous.	It is cancerous.

4. Methanogenic bacteria or methanogens are the group of anaerobic microbes which digest organic mass as well as aerobic microbes of the sludge to produce a mixture of gases containing methane, H_2S and CO_2 called biogas.

5. Parasitism is relationship between two living organisms of different species in which one organism obtains food from another living organism whereas competition is rivalry between two or more organisms of same or different species for obtaining the same resources.

Both parasitism and competition are negative population interactions. In parasitism, one organism (parasite) has negative effect on other organism (host) and in competition, both species are negatively affected.

6. **(a)** In the given figure, A is Natality.

(b) In the given figure, B is Mortality.

(c) If N is the population density of time 't', then its density at time 't + 1' will be

$$N_{t+1} = N_t + [(B + I) - (D + E)]$$

Where, B = Natality

I = Immigration

D = Mortality

E = Emigration

OR

Small animals have large surface area relative to volume, so they tend to lose body heat very fast in cold environment as compared to large animals. They have to spend more energy to generate body heat through metabolism. Thus, considering the difficulty of maintaining constant internal temperature, small animals are rarely found in polar regions.

7. The differences between active and passive immunity are :

	Active immunity	Passive immunity
(i)	It is developed when the person's own cells produce antibodies in response to infection or vaccine.	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen such as snake venom.

(ii)	It provides relief only after long period.	It provides immediate relief.
(iii)	It has no side effects.	It may cause reaction.
(iv)	It is long lasting.	It is not long lasting.

OR

Withdrawal syndrome is group of symptoms that occur in drug and alcohol addicted individuals who abruptly discontinue or reduce the use of drug of their choice. Withdrawal symptoms include anxiety and nausea.

8. (a) Guardians fear that their adolescent wards may get trapped in drug/alcohol abuse because it has been observed that use of drugs has increased especially among youth. Adolescence (age group 12-18 years) is the period in which an adolescent is accompanied by several biological and behavioural changes. This is also a very vulnerable phase of mental and psychological development of an individual. Curiosity, need for adventure and excitement, experimentation and exposure to media are some common causes that motivate the youngsters towards drug and alcohol abuse. Of late, stress (to excel in academics or examination) has played major role in persuading youngsters to try alcohol and drugs.

(b) The prolonged use of drugs/alcohol may lead to the dependence of body upon them. Addiction is the habitual, physiological and psychological dependence on substance or practice which is beyond voluntary control. Addiction is a chronic, progressive and sometimes fatal disorder with both genetic and environmental roots. It manifests as a compulsion that drives an individual to continue to behave in a way that is harmful to self and loved ones, despite an intense desire to halt that behaviour. Medically, addiction is of three types: tobacco addiction, alcohol addiction and drug addiction.

Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drug or alcohol is abruptly discontinued.

9. When restriction enzymes cut the strand of DNA a little away from the centre of the palindromic sites, between the same two bases on the opposite strands, it leaves single stranded portions at the ends. This forms overhanging stretches called sticky ends on each strand. They are called sticky as they form hydrogen bonds with their complementary cut counterparts. The stickiness of the ends facilitates the action of the enzyme DNA ligase.

10. More than a thousand varieties of mango in India exhibit genetic diversity. Genetic diversity represents the diversity in number and types of genes as well as chromosomes and variations in the genes and their alleles in the same species.

The reason for this genetic diversity is the occurrence of variations in environmental parameters and use of horticulture techniques like grafting, breeding, etc.

11. Conservation of biodiversity is protection, uplift and scientific management of biodiversity so as to maintain it at its optimum level and derive sustainable benefits for the present as well as future generations. There are two types of conservation strategies – *in-situ* (on site) and *ex-situ* (off site).

In-situ conservation is conservation and protection of the whole ecosystem and its biodiversity at all levels in their natural habitat in order to protect the threatened species. It involves hotspots and protected areas. Hotspots are areas of high endemism and high level of species richness. Protected areas are ecological/ biogeographical areas where biological diversity along with natural and cultural resources is protected, maintained and managed through legal or other effective measures. Protected areas include national parks, sanctuaries and biosphere reserves.

Ex-situ conservation is conservation of threatened plants and animals in places outside their natural homes under full protection and supervision. It includes offsite collections and gene banks.

12. Some genes called selectable markers help in selecting those host cells which contain the vectors and eliminating the non-transformants. β-galactosidase is an alternative selectable marker developed to differentiate recombinants and non-recombinants on the basis of their ability to produce colour in the presence of a chromogenic substance. A recombinant DNA is inserted in the coding sequence of an enzyme β-galactosidase. This causes inactivation of the enzyme which is called insertional inactivation. If the plasmid in the bacterium does not have an insert, the presence of a chromogenic substrate gives

blue coloured colonies. Presence of insert results into insertional inactivation of the β-galactosidase and, therefore, the colonies do not produce any colour, these colonies are marked as recombinant colonies.

β-galactosidase is a preferred selectable marker to antibiotic resistance genes because due to inactivation of antibiotics, selection of recombinants becomes burdensome process as it requires simultaneous plating on two plates having different antibiotics. But by using β-galactosidase as selectable marker, we can select recombinants and non-recombinants on a single plate.

13. (a) pBR322 is the first artificial cloning vector constructed in 1977 by Boliver and Rodriguez. It is widely used in gene cloning experiments.

(b) '*rop*' codes for the proteins involved in the replication of the plasmid.

(c) amp^R (ampicillin resistance) and tet^R (tetracycline resistance) are two resistance genes which are useful for selectable markers. The presence of restriction sites within the markers tet^R and amp^R permits an easy selection for cells transformed.

OR

(a) The given plasmid vector is pBR322. It is an extra-chromosomal, self-replicating, usually circular, double stranded DNA molecules found naturally in many bacteria and some yeast.

(b) Labelled part A represents origin of replication (*ori*). It is a specific sequence of DNA bases which is responsible for initiating replication.

(c) B-Ampicillin resistance gene, C-Tetracycline resistance gene, D - Cleavage site. B and C are antibiotic resistance genes which are useful as selectable markers. These help in selecting transformants (host cells containing vectors) from non - transformants. D is the recognition site for restriction enzyme.

(d) The recognition sites for enzymes *Pst* I and *Pvu* I are present in the ampicillin resistant gene (B) and recognition sites for enzymes *Bam* HI and *Sal* I are present within tetracycline resistant gene (C).