CBSE Class 12 Biology 2021 - Set 57/1/1 - Compartment

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) All questions are compulsory.

(ii) There are 33 questions in the question paper.

(iii) Section A: Questions 1 to 14 carry 1 mark each. Questions 15 and 16 are case based questions carrying 4 marks each; answer any four subquestions in each.

(iv) Section B: Questions 17 to 25 carry 2 marks each.

(v) Section C: Questions 26 to 30 carry 3 marks each.

(vi) Section D: Questions 31 to 33 carry 5 marks each.

(vii) Answers should be brief and to the point.

(viii) There is no overall choice. Internal choices are provided in some questions; attempt only one alternative in such questions.

(ix) Draw neat, proportionate and properly labelled diagrams wherever necessary.

Section A

1. Write the possible genotypes of a person with blood group 'B'.

2. Write the scientific name of the causative agent of pneumonia in humans and mention one specific symptom of the disease.

3. Why do cattle and goats generally not browse on Calotropis plants growing in an abandoned field? Give any one reason.

4. Expand MALT and mention any one location of it in the human body.

5. Write the dominant traits in pea plants observed by Mendel with respect to:

(a) colour of pea pod.

(b) flower position.

6. After separation of DNA fragments by gel electrophoresis and staining with ethidium bromide, a student placed the gel in the UV chamber under the UV light. State a reason for doing so.

7. What for are Cyclosporin A and Streptokinase bioactive molecules prescribed by a doctor?

8. Write the symbolic representation used in a pedigree chart showing (i) a carrier mother and (ii) a sufferer son, with respect to haemophilia.

9. Write the full name of the technique used for the transfer of early embryos in the uterus of the mother for further development. Write the minimum number of blastomeres the embryo must have before being transferred.

10. For early detection of cancer, 3-D images of tissues are essential. Name the technique and the basis on which it can generate three-dimensional image of changes in the living tissue.

11(a). Read the following Assertion and Reason and choose the correct option.

Assertion: Statutory ban on amniocentesis for sex-determination is to legally check increasing female foeticide.

Reason: In amniocentesis, some of the amniotic fluid that has the developing foetus is taken to analyse the chromosomes in the foetal cells.

(A) Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion.

(C) Assertion is true, but Reason is false.

(D) Both Assertion and Reason are false.

OR

11(b). Read the following Assertion and Reason and choose the correct option.

Assertion: Our laws permit legal adoption and it is as yet, one of the best methods for childless couples looking for parenthood.

Reason: Emotional, religious and social factors are also no deterrents in the legal adoption of orphaned and destitute children in India.

(A) Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion.

(C) Assertion is true, but Reason is false.

(D) Both Assertion and Reason are false.

12. Read the following Assertion and Reason and choose the correct option.

Assertion: When DNA from two different sources are cut by the same restriction enzyme, the resultant DNA fragments have different kinds of 'sticky ends'.

Reason: These can be joined together end-to-end using DNA ligases.

(A) Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion.

(C) Assertion is true, but Reason is false.

(D) Assertion is false, but Reason is true.

13. Read the following Assertion and Reason and choose the correct option.

Assertion: Large holes in 'Swiss cheese' are due to the production of a large amount of carbon dioxide by specific microbe.

Reason: The specificity of characteristic texture, flavour and taste of 'Swiss cheese' is due to the use of bacterium Propionibacterium shermanii.

(A) Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion.

(C) Assertion is true, but Reason is false.

(D) Both Assertion and Reason are false.

14. Read the following Assertion and Reason and choose the correct option.

Assertion: The progenies of a test cross can be easily analysed to predict the genotype of the test organism.

Reason: In a typical test cross, an organism showing a recessive phenotype is crossed with a recessive parent instead of self-crossing.

(A) Both Assertion and Reason are true, and Reason is the correct explanation of the Assertion.

(B) Both Assertion and Reason are true, but Reason is not the correct explanation of the Assertion.

(C) Assertion is true, but Reason is false.

(D) Both Assertion and Reason are false.

15(i). Read the passage and answer any four of the five questions that follow.

Acacia plants are particularly common in drier tropical and subtropical environments in the world. The swollen thorn acacias, which form obligate mutualisms with Pseudomyrmex, a species of ants, are restricted to the New World. Swollen thorn acacias show several characteristics related to their obligate association with ants, including enlarged thorns with a soft, easily excavated pith; year-round leaf production; enlarged foliar nectaries; and leaflet tips modified into concentrated food sources called Beltian bodies. The thorns provide living space, while the foliar nectaries provide a source of sugar and liquid. Beltian bodies are a source of oils and protein. Resident ants vigorously guard these resources against encroachment by nearly all comers, including other plants.

The association between the genus of Acacia and Pseudomyrmex species of ants depict population interactions, known as:

(A) Competition

(B) Amensalism

(C) Mutualism

(D) Predation

15(ii). In exchange for food and shelter, ants protect Acacias from the attacks of:

(A) Fungi
(B) Bacteria
(C) Herbivores
(D) Carnivores

15(iii). The above interaction suggests that the relationship between the two species is an example of:

(A) Competitive release
(B) Competitive exclusion
(C) Co-evolution
(D) Resource partitioning

15(iv). The removal of resident ants from the Acacias will lead to:

I. Reduced growth of Acacias

II. Increased growth of Acacias

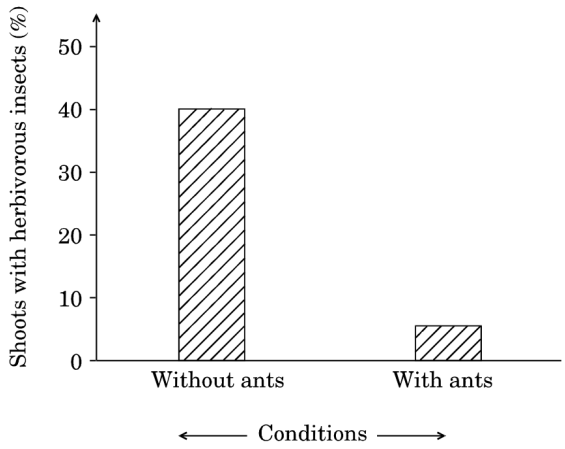
III. Reduced population of ant species

IV. Increased population of ant species

Choose the correct alternative from the above statements:

(A) Only I is true
(B) I and III are true
(C) III and IV are true
(D) I and IV are true

15(v). Given below is a graphical representation of ants and the Acacia shoots with abundance of herbivorous insects:



The conclusion drawn from the above data is:

(A) Acacia shoots will have higher rates of growth with resident ant species.
(B) Acacia shoots will have neutral effect on growth with or without resident ant species.
(C) Acacia shoots will have higher rates of growth without resident ant species.
(D) Growth of Acacia shoots is independent of resident ant species.

16(i). Read the passage and answer any four of the five questions that follow.

Experiments involving cloning genes and expressing proteins require the use of host cells to receive the foreign cloned gene. In some experiments, prokaryotes such as E. coli and Bacillus subtilis, and eukaryotes such as the budding yeast (Saccharomyces cerevisiae) are used as host cells for DNA cloning. These host cells are relatively easy to grow in the laboratory and have been studied extensively for decades. Their genetics have been well-understood and therefore can be manipulated to make them appropriate hosts. Many types of cells can be converted into biochemical factories using r-DNA technology to produce various kinds of biomolecules. E. coli and B. subtilis are both commonly used as host cells for DNA cloning. Fortunately, humans have become very experienced at cultivating microbes cheaply and efficiently on large and small production scales. Over the centuries, brewers and bakers have learned to employ yeast cells to manufacture beer, bread and related food products. In terms of impact on the human health, probably the most important product made by bacteria are antibiotics.

The most commonly used eukaryotic microorganism used in biotechnology is:

(A) E. coli
(B) Bacillus subtilis
(C) Saccharomyces cerevisiae
(D) Drosophila

16(ii). Over the centuries, brewers and bakers have learned to employ yeast cells to manufacture many household products. Select the option with all the correct answers from the given list:

(A) Bread, Idli, Roquefort cheese
(B) Bread, Toddy, Swiss cheese
(C) Dosa, Idli, Bread
(D) Lipases, Pectinases, Zymase

16(iii). The most common product made by certain bacteria having a great impact on human health is:

(A) Antibiotics
(B) Bioactive molecules
(C) Enzymes
(D) Fermented drinks

16(iv). The best known host cells for DNA cloning and producing various kinds of biomolecules is:

(A) Agrobacterium tumefaciens
(B) Escherichia coli
(C) Bacteriophage lambda
(D) Bacteriophage φX174

16(v). The enzyme that is not required to manipulate the genetics of the microorganism so as to convert them into biochemical factories is:

(A) Restriction endonuclease
(B) DNA polymerase
(C) Lactase
(D) Ligase

Section B

17. (a) Write the two crucial changes the seeds undergo while reaching maturity that enable them to be in a viable state until the onset of favourable conditions.

(b) Name the oldest viable seed excavated from Arctic Tundra as per the records.

18. Describe the two basic processes which contribute to an increase in population density of an area.

19. Draw a labelled schematic representation of the Central Dogma of Molecular Biology as proposed by Francis Crick.

20. Explain commensalism with the help of an example from the animal world.

21. (a) Write two closely linked genes that control α-Thalassemia.

(b) Differentiate between Thalassemia and Sickle cell anaemia on the basis of their effect on globin molecule of haemoglobin.

22(a). Explain the mechanism of pollination in marine sea-grasses like Zostera.

OR

22(b). Name and state the function of interstitial cell present in the human testes.

23. Write the different components of activated sludge. Explain the different ways it can be used further in sewage treatment process.

24. State any four salient observations drawn from the Human Genome Project.

25(a). How is the use of 'microinjection' different from using the 'method of biolistics' in biotechnology? Explain.

OR

25(b). Name the Indian crop variety for which in 1997 an American company got patent right through the US Patent and Trademark Office. Why did the company claim it to be an invention or a novelty?

Section C

26. Answer the following questions with reference to 'opioids', the commonly abused drug:

(a) Where in our body are the specific opioid receptors present?

(b) What is heroin chemically known as?

(c) Write the scientific name of the plant from which opioids are extracted.

27(a). Draw a polynucleotide chain (four nucleotides long) of DNA having four variable nitrogenous bases.

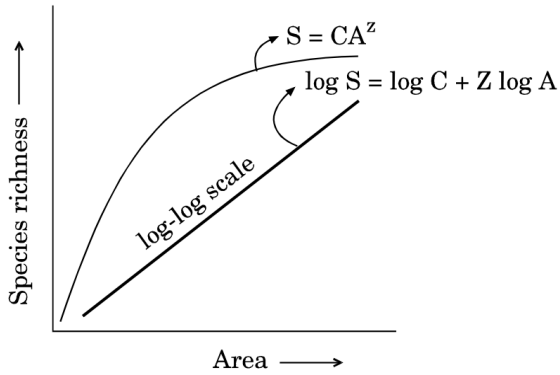
OR

27(b). Draw a neat labelled diagram of a nucleosome. Name the two basic amino acid residues present mainly in the nucleosome.

28. Explain the uterine changes taking place during the follicular phase of the menstrual cycle in a human female. Name and explain the role of hormones that bring about these changes.

29. Explain only with the help of self-explanatory diagram, the three basic steps of Polymerase Chain Reaction (PCR).

30. Study the graphical representation of Species richness - Area relationship given below and answer the questions that follow:



(a) What do S, C, Z and A represent in the given graph?

(b) What will be the range value of 'Z line' if we analyse the species - area relationship among very large areas like entire continent?

Section D

31(a). How did Matthew Meselson and Franklin Stahl experimentally prove that DNA replication is semiconservative? Explain.

OR

31(b). (i) Name and describe the technique which is an important tool of forensic science.

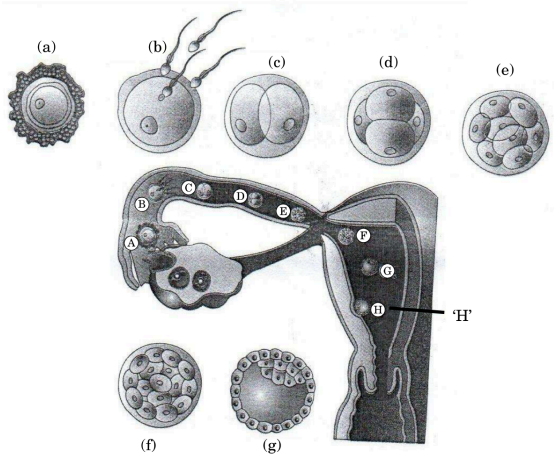
(ii) Mention any two applications of this technique other than its use in forensic studies.

32(a). Explain the three different approaches used in the treatment of a person suffering from Adenosine Deaminase (ADA) Deficiency.

OR

32(b). Explain how does an antibiotic resistance gene in a cloning vector (plasmid pBR 322) help in selecting the recombinants from the non-recombinants.

33(a). Study the figure given below of a human female reproductive tract showing the transport of ovum, its fertilisation and growing embryo moving through the fallopian tube and answer the questions that follow:

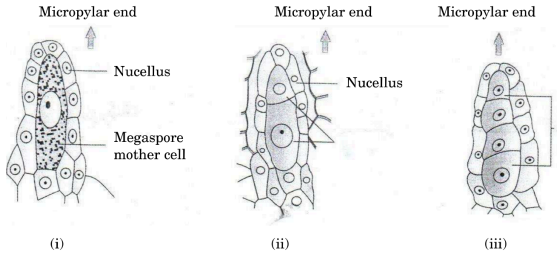


(i) Identify the embryonic stages 'e' and 'g' and differentiate between them.

(ii) Describe the process of implantation as shown in figure 'H'.

OR

33(b). Study the figures given below of the development of megaspore in an angiosperm and answer the questions that follow:



(i) Describe the developmental events in the nucellus of the ovule. What is this type of development of megaspore referred to as?

(ii) How many free nuclear mitotic divisions will the functional megaspore undergo to form a mature embryo sac?

(iii) Describe the structure of a typical female gametophyte of a flowering plant.

- End of Question Paper -