

CBSE Class 12 Biotechnology 2020 - Set 99/C - Compartment



Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

- (i) Read the following instructions very carefully and strictly follow them :
- (ii) This question paper comprises four sections — A, B, C and D. There are 30 questions in the question paper. All questions are compulsory.
- (iii) Section A – Question nos. 1 to 7 are very short answer questions carrying 1 mark each. Question nos. 8 to 11 are multiple choice questions, carrying 1 mark each and question no. 12 is based on text carrying 4 questions of 1 mark each.
- (iv) Section B – Question nos. 13 to 19 are short answer questions-I, carrying 2 marks each.
- (v) Section C – Question nos. 20 to 26 are short answer questions-II, carrying 3 marks each.
- (vi) Section D – Question nos. 27 to 30 are long answer questions, carrying 5 marks each.
- (vii) Answers should be brief and to the point.
- (viii) There is no overall choice in the question paper. However, an internal choice has been provided in three questions of 1 mark, two questions of 2 marks, two question of 3 marks and two questions of 5 marks. You have to attempt only one of the choices in such questions.
- (ix) The diagram drawn should be neat, proportionate and properly labelled, wherever necessary.
- (x) Use of calculators is not permitted.

Section A

1. Why is agar added to the culture medium used for culturing microbes ?

2. Pectinase enzyme is needed to isolate single cells from a plant tissue. Why ?

OR

2. For genetic transformation vector, which two DNA sequences are cloned in the T-DNA region of Ti-plasmid in place of unwanted DNA sequences ?

3. Give an example of a disease caused by the absence of the enzyme adenosine deaminase.

OR

3. What is the cause of thalassemia ?

4. In recombinant DNA technology, what is an 'insert' ?

5. Which database retrieval tool carries information on taxonomic classification of an organism ?

OR

5. Name a single gene mutation in humans which follows Mendelian inheritance, having chromosome 7 as its genomic location.

6. Frozen animal cell culture should be thawed in a water-bath maintained at 37°C, with moderate shaking. Why ?

7. What are the two limitations of the germplasm conservation through conventional methods ?

8. Polyethylene glycol is a

- | | |
|-----------------------------|-------------------------------|
| (A) Fusogenic chemical | (B) Callus stimulant |
| (C) Electrofusion stimulant | (D) Differentiation stimulant |

9. Which one of the following restriction enzymes produces blunt ends in a DNA fragment ?

- | | |
|-------------------|---------------------|
| (A) <i>Alu</i> I | (B) <i>Eco</i> RI |
| (C) <i>Bam</i> HI | (D) <i>Hind</i> III |

10. The study of full complement of proteins expressed by a genome is called

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|--------------|----------------------|
| (A) Proteome | (B) Proteomics |
| (C) Genomics | (D) Protein analysis |

11. Which of the following is a function of cryoprotective agents ?

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|---|--|
| (A) Long-term preservation of cultures | (B) Prevention of cell damage due to ice crystal formation |
| (C) Prevent formation of inclusion bodies | (D) To trap the liquid nitrogen |
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12. Question numbers 12(i) to 12(iv) are based on the following text :

The culturing of animal cells under *in-vitro* conditions involves appropriate physical, nutritional and hormonal environments. The physical environment includes controlling the temperature maintained at 37°C, pH around 7 – 7.4, osmolality and gaseous environment by providing a supporting surface and protecting the cells from physical, chemical and mechanical stress.

12(i). Name the type of culture which is prepared by inoculating directly from the tissue of an organism to the medium of culture.

- | | |
|--------------------------|------------------------------|
| (A) Secondary cell line | (B) Cell line |
| (C) Primary cell culture | (D) Transformed cell culture |
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12(ii). pH of culture (animal cell) medium is controlled by

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|---------------------------------|------------------------------------|
| (A) Presence of CO ₂ | (B) Presence of bicarbonate buffer |
| (C) Addition of bases | (D) Addition of citric acid |
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12(iii). Major contributors to osmolality of medium for animal cell culture are

- | | |
|--|--------------------------------|
| (A) Salt and glucose | (B) Serum and antibiotics |
| (C) Sodium bicarbonate and CO ₂ | (D) Phenol red and trypan blue |
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12(iv). Disaggregation of cells for cell culture can be achieved by the enzyme

- | | |
|------------------|----------------------|
| (A) Trypsin | (B) Collagenase |
| (C) Chymotrypsin | (D) Both (A) and (B) |
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Section B

13. Differentiate between Batch and Fed-Batch culture.

14. Differentiate between Paralogous and Homologous DNA sequences.

15. Why do the scientists artificially infect the plants with *Agrobacterium rhizogenes* ?

16. r-HuEPO has advantages over blood transfusion. List any two of them.

17. Calculate the generation time of a bacterial population in which the number of bacteria increases from 10^4 /mL to 10^7 /mL during four hours of exponential growth.

18. A recombinant vaccine is prepared using the selected epitopes of a given protein. What are the advantages of doing so ?

OR

18. 'Molecular pharming' has advantages of producing recombinant protein in milk as compared to microbial fermentation. Write any two advantages.

19. How does Restriction Modification system work as a defense system in bacteria ?

OR

19. Give the function of these enzymes in cloning :
DNA ligase and alkaline phosphatase

Section C

20. Give reasons for the following :

- (a) Cos sites or cohesive sites of bacteriophage lambda should not be replaced by the insert DNA.
- (b) Expression vectors are preferred, if the foreign protein has to be produced in the host.
- (c) Yeast is a preferred host for the expression of eukaryotic genes.

21. With an example, describe a technique which can be used to compare the peptides of a similar protein from different sources.

22. (a) Complete (Identify A, B, C, D, E) the comparison of Human communication language with Biological Language.

<i>Human Communication Language</i>	<i>Biological Language</i>
Alphabet	A
Words	B
C	Operons
D	Turns, Kinks, Bends
Chapter	E

(b) In which field of science, is this biological language used ?

OR

22. What kind of analysis can be carried out using Bioinformatics tools ?

23. What were the observations made by Margaret O. Dayhoff while studying the variations in protein sequence during evolution ?

24. A typical purification scheme of a desired protein is shown :

	Procedure	Total Protein (mg)	Activity (units)	Specific Activity (units/mg)
(i)	Crude extract	20,000	40,00,000	200
(i i)	Precipitation	5,000	30,00,000	600
(i i i)	Ion-Exchange Chromatography	200	8,00,000	4,000
(i v)	Affinity Chromatography	150	7,50,000	4,000

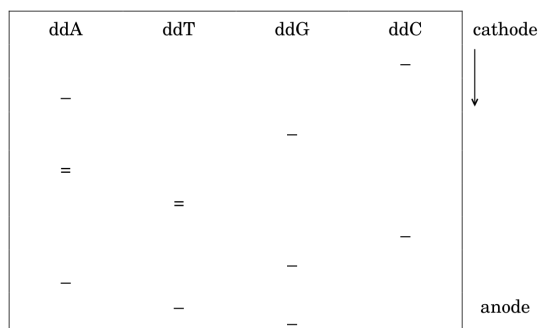
- (a) Which step of purification is of least importance and why ?
- (b) Why does the total amount of protein decrease with each step of the purification procedure ?

25. PHB (Polyhydroxybutyrate) production in bacteria has many drawbacks. Why ? Give one reason. How has genetically engineered *Arabidopsis* solved this problem ?

OR

25. (a) How is 'Golden Rice' developed ?
- (b) Name any one scientist involved with the development of 'Golden Rice'.

26. Read the sequence from the gel, obtained by dideoxy nucleotide chain termination method. Write the sequence of the original DNA strand. Also show the cuts produced in the obtained sequence by subjecting the obtained sequence to digestion by *EcoRI* enzyme.



Section D

27. (a) What is Restriction Fragment Length Polymorphism (RFLP) ?
(b) Which two individuals can have the same RFLP pattern ?
(c) Give two applications of RFLP.
(d) Why are Restriction Enzyme type II used in recombinant DNA technology and in RFLP generation ?

28. (a) What is a callus ? Callus culture is of great significance in plant tissue culture. Justify, giving two applications.
(b) How are cybrids produced ?
(c) Endosperm culture has a great commercial significance. How ?

OR

28. (a) Define the term 'totipotency'.
(b) List four major steps in the process of micropropagation.

29. (a) What is a Metagenome ?
(b) Describe the procedure of developing a metagenome.
(c) Give the importance of Metagenomics approach.

OR

29. (a) What are the main considerations for safety aspects, specific to microbial biotechnology ?
(b) State the role of microbial culture collection centres.
(c) Lyophilized cultures of microbes remain viable for several years. Why ?

30. Give reason for the following :
(a) Van der Waals forces are weak forces but still play a significant role in determining the 3-D structure of biomolecules.
(b) Strength of ionic bond is reduced in water.
(c) Sickle shape of RBCs are responsible for anemic condition of patients.
(d) Mass spectrometer is advantageous for sequencing of amino acids.
(e) Quarternary structure of proteins are multimeric in nature.

- End of Question Paper -