

CBSE Class 12 Biotechnology 2024 - Set 99/S - Compartment



Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions

- (i) This question paper contains 33 questions. All questions are compulsory.
- (ii) Question paper is divided into five sections – Section A, B, C, D and E.
- (iii) Section A : Questions number 1 to 16 are Multiple Choice Type Questions. Each question carries 1 mark.
- (iv) Section B : Questions number 17 to 21 are Very Short Answer Type Questions. Each question carries 2 marks.
- (v) Section C : Questions number 22 to 28 are Short Answer (SA) Type Questions. Each question carries 3 marks.
- (vi) Section D : Questions number 29 and 30 are Case-based Questions carrying 4 marks each. Each question has sub-parts with internal choice in one sub-part.
- (vii) Section E : Questions number 31 to 33 are Long Answer (LA) Type Questions. Each question carries 5 marks.
- (viii) There is no overall choice given in the question paper. However, an internal choice has been provided in few questions in all the Sections except Section A.

Section A

1. Cosmid vectors can be used to clone DNA fragments up to _____ in size.

- (A) 8 kb (B) 100 kb
(C) 45 kb (D) 23 kb

2. Calculate the mass to charge ratio of a protein ion with molecular weight at 10,000 Daltons carrying charge of 5^+ .

- (A) 2001 (B) 2000
(C) 2002 (D) 2005

3. Proteome mining refers to determination and study of _____.

- (A) Post-translational modifications (B) Drug targets
(C) Signal transduction (D) Protein interactions

4. In a fermentor, _____ can be used to achieve both sterilisation and aeration.

- (A) Impeller (B) Baffles
(C) Jacket (D) Sparger

5. Transfer of regenerated plants, using tissue culture, to the greenhouse is known as :

- (A) Organogenesis (B) Plantation
(C) Acclimatization (D) Embryogenesis

6. _____ is a glycoprotein which is involved in RBC production and wound healing.

- (A) Erythropoietin (B) Factor VIII
(C) Herceptin (D) Tissue Plasminogen Activator

7. _____ enzyme is used to join an insert with the vector.

- (A) DNA polymerase (B) DNA ligase
(C) Alkaline Phosphatase (D) DNase

8. Thalassemia is a genetic disease caused due to :

- (A) Absence of a protein (B) Absence of a subunit
(C) Absence of an amino acid (D) Structurally altered proteins

9. A eukaryotic host that does not secrete its own proteins into the fermentation medium is _____.

- (A) *Escherichia coli* (B) *Aspergillus niger*
(C) *Saccharomyces cerevisiae* (D) *Pichia pastoris*

10. Monoclonal antibodies are produced by fusing antigen activated B-lymphocytes with a myeloma cell, to achieve _____.

- (A) Contact inhibition (B) Immortality
(C) Adherence (D) Shape

11. Identify the plant viral vector from the following :

- (A) Gemini virus (B) Adeno virus
(C) Retro virus (D) *Agrobacterium tumefaciens*

12. Finite animal cell lines have a limited life span and their doubling time is _____.

- (A) 12 to 36 hours (B) 12 to 48 hours
(C) 24 to 96 hours (D) 24 to 120 hours
-

13. **Assertion (A):** The restriction sequences are always palindromic in nature.

Reason (R): The restriction sequence in both DNA strands, read same from 5' to 3' direction.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.
-

14. **Assertion (A):** Virus-free plants are not viral resistant.

Reason (R): Virus-free plants can catch viral infection later while growing in fields.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.
-

15. **Assertion (A):** Lyophilisation of a microbial culture involves freezing followed by drying under vacuum.

Reason (R): Freeze drying results in sublimation of ice crystals.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.
-

16. **Assertion (A):** Tissue culture hoods are equipped with a UV light source.

Reason (R): UV light source can be turned on to sterilize the surfaces of the hood.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.
-

Section B

17. A researcher wants to raise a triploid plant of apple. How can he do so ? What advantage can be offered by a triploid plant ?

18. Write about any two methods that are used to improve the desirable characteristics of microbial strains.

19. Compare the advantages provided by M13 and lambda bacteriophages as vectors in cloning experiments.

20(a). Distinguish between chymotrypsin and chymotrypsinogen.

OR

20(b). What kind of compounds are present in mosquito repellants like malathion or parathion ? How do they work ?

21. Explain blue-white selection method to screen recombinants.

Section C

22. Briefly outline the strategy to develop plants with the following traits : (Any three) (a) Fungal resistant (b) Herbicide tolerant (c) Delayed fruit ripening (d) Drought tolerant

23(a). Differentiate between pluripotent and multipotent stem cells citing examples.

23(b). Name any two medical conditions where stem cell therapy can be used.

24. Stepwise illustrate PCR mechanism with proper labelling.

25(a). Differentiate between analytical and industrial enzymes.

25(b). Name the growth factor that has been approved for diabetics who develop skin ulcers.

26. Genetically modified plants are likely to become a crucial tool in feeding the world's growing population. Discuss any three concerns about possible risks.

27(a). Give one use each of the following components which are added to the animal culture media : (i) Sodium bicarbonate (ii) Serum (iii) Phenol red (iv) Glucose

27(b). Why is an inverted microscope made use of in animal cell culture labs ?

28(a). Name any two properties that can be improved by performing protein engineering on an enzyme.

28(b)(i). Discuss the development of Hepatitis-B Vaccine.

OR

28(b)(ii). Define the three parameters that signify the dietary value of a protein.

Section D

29. Carefully study the following table that lists genome size, Gene predictions and coding area between several organisms and answer the questions that follow :

Organism	Genome Size	Predicted Genes	Coding Area
Bacteria	500,000 bp	5000	450,000 bp
Yeast	12,000,000 bp	6000	8,400,000 bp
<i>Drosophila</i>	175,000,000 bp	13,000	35,000,000 bp
<i>Arabidopsis</i>	157,000,000 bp	25,000	31,400,000 bp
Humans	3×10^9 bp	25,000	90,000,000 bp

29(a). Which organism has 90% part of the genome that encodes for proteins ?

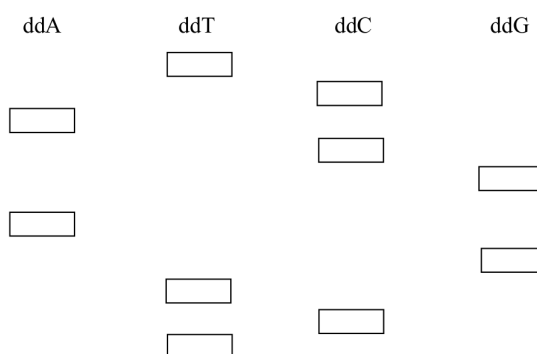
29(b). Which organism has predicted genes less than 5% of its genome ?

29(c)(i). Give two reasons as to why in silico gene prediction can never be 100% accurate.

OR

29(c)(ii). Mention any two reasons for non-linear relationship between number of genes and number of proteins encoded by an organism.

30. Examine the following gel pattern obtained after sequencing of a DNA fragment using Sanger's Dideoxy Chain Termination method and answer the questions that follow :



30(a). Read the autoradiogram from 5'– 3' direction.

30(b). Deduce the sequence of the original strand which was subjected to sequencing.

30(c)(i). State the principle of Sanger's dideoxy method of DNA sequencing.

OR

30(c)(ii). Why is an autoradiogram read from bottom to top ?

30-VI. For visually impaired candidates only, in lieu of Question 30.

Explain Sanger's method of DNA sequencing. Why is Sanger's method known as chain termination method ?

Section E

31(a)(i). Compare the technique of FISH with karyotyping for determining the severity of CML disease.

31(a)(ii). How can microarray be used to study cellular response to the environment ? Explain.

OR

31(b)(i). Many kinds of analysis can be made using bioinformatics tools. Suggest any two possible ways for going about analysing a given sequence using them.

31(b)(ii). Explain the process of curation.

32(a). Outline schematically the steps involved in Protein Fingerprinting.

OR

32(b). Explain the principle behind the technique of 2-D Gel Electrophoresis. Why is it considered a high resolution method ?

33(a)(i). Explain briefly any two ways to measure microbial growth in culture.

33(a)(ii). Draw a typical bacterial growth curve showing all the phases.

OR

33(b)(i). Differentiate between primary and secondary metabolites of microbial culture.

33(b)(ii). Define the following terms giving an example each : (I) Microbial Leaching (II) Microbial Biotransformation (III) Single Cell Proteins

- End of Question Paper -