I Preboard (2020-21)

Class XII

Biotechnology (045)

Theory Time: 3 Hours | Maximum Marks: 70

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has four sections: Section A, Section B, Section C and Section. There are 33 questions. All questions are compulsory.

(iii) Section A has 14 questions of 1 marks each and two case –based questions, Section B has 9 questions of 2 marks each, Section C has 5 questions of 3 marks each, and Section D has 3 questions of 5 marks each.

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

(v) Wherever necessary, neatly labeled diagrams should be drawn.

	SECTION A	
1.	What are expression vectors?	1
2.	On which chromosome in humans, is the genetic defect for the Alzheimer's disease located?	1
3.	What is Biological value?	1
4.	Choice of vectors in an experiment depends on what two factors?	1
5.	Counting genes and predicting their presence have proved to be laden with inaccuracies. Give reasons.	1
6.	What is the advantage of creating triploid plants? OR What is the advantage of creating haploid plants?	1
7.	Give full form of i) SCID ii) MALDI	1
8.	Give any two limitations of animals cell culture.	1
9.	Transfer of foreign DNA into cultured host cells is mediated through chemicals is called	1
10.	Name the amino acids involved in the catalytic triad that regulate charge relay system in the enzyme subtilisin?	1

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11.	(i) Assertion - sickle cell anaemia is a molecular disease. Reason - point mutation cause change in position of glutamic acid with that of valine in the beta globin chain of haemoglobin. (a) Both Assertion and Reason are true and the reason is the correct explanation of the assertion (b) Both Assertion and Reason are true but the reason is not the correct explanation of the assertion (c) Assertion is true but Reason is false (d) Both Assertion and Reason are false	1
12.	Horseradish peroxidase is used in a) Biosensor b) Biochip c) quantitative estimation of glucose d) Diagnostic kit	1
13.	What is an annotated collection of all publicly available nucleotide and protein? a) NCBI b) EMBL c) GenBank d) DBJ	1
14.	In which process the electric current of high voltage is applied to transfer foreign DNA? a) transformation b) electroporation c) biolistic gun d) microinjection	1
15.	Question numbers 15(i) to 15(iv) are based on the following text on composition of nutrient media- Composition of nutrient media governs the growth and morphogenesis of plant tissues in vitro. Generally, culture tissue requires the same nutrients as the whole plant. But laboratory grown cultures require some special components that promote optimum growth of a tissue under laboratory conditions. Depending on the type of plant cells or tissue used for culture the composition of nutrient media vary. During the past two decades, considerable progress has been made on the development of media for growing plant cells, tissues and	4

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	organs aseptically. i) optimum pH for growth and development of culture tissues is a) pH 5.0-6.0 b) pH 6.0-7.0 c) pH 4.5-5.0 d) pH7.0-8.0 ii) which of the following media is most commonly used in plant tissue culture? a) White's medium b) B5 medium c) N6 medium d) MS medium iii) what occurs at high cytokinin : auxin ratio? a) rooting b) shooting c) somatic embryo d) callus iv) How does laminar air flow help in tissue culture? a) it kills contaminants b) it separates contaminants c) it creates aseptic conditions for tissue culture d) it creates anaerobic condition for tissue culture.	
16.	Read the following and answer questions from 16 (i) to 16 (iv) Different species of bacteria contain their own sets of restriction endonucleases and corresponding methylases. Three main classes of restriction endonucleases- type I, type II and type III are present, of which, only type II restriction enzymes are used in rDNA technology as they recognise and cut DNA within a specifc sequence typically consisting of 4-8 bp. This sequence is referred to as a restriction site and is generally palindromic, which means that the sequence in both DNA strands at this site read same 5' to 3' direction. Type II restriction enzymes are named after the bacterial species they have been isolated from. For example a commonly used restriction enzyme EcoRI isolated from the bacterial species E. coli is named so with the first three italicised alphabets referring to the genus (E) and species (co), the capital R referring to the strain (RY 13) and the number designated with the	4

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	roman numeral (I) indicating that it was the first enzyme to be isolated from this strain of bacteria. i) Restriction enzymes were first discovered and studied by the molecular biologists a) H. Smith, D. Nathans, W. Arber b) M. Avery, McLeod, H. Smith c) W. Arber, D. Nathans, M. Avery d) H. Smith, McLeod, McCarthy ii) Type II restriction enzymes are used in rDNA technology as they a) recognise and cut DNA within a specifc sequence b) recognise and cut DNA within a specifc sequence and require no ATP c) recognise and cut DNA within a specifc sequence and need ATP d) All of the above iii) EcoRI and Alu I cuts restriction sites in a way producing- a) sticky and cohesive ends only b) sticky and blunt ends c) blunt and sticky ends d) none of the above iv) 5'C-T-G-C-A-G 3' and 5'G-G-C-C 3' 3'G-A-C-G-T-C 5' 3'C-C-G-G 5' Above two recognition sites are cleaved by those restrictions endonucleases whose microbial sources are- a) Haemophilus aegyptus and Haemophilus influenza b) Providencia stuartii and Haemophilus influenza c) Haemophilus aegyptus and Providencia stuartii d) Providencia stuartii and Haemophilus aegyptus	
	SECTION B	
17.	Thalassemic patients produce excess Alpha or beta subunits of haemoglobin leading to impaired oxygen binding capacity by their erythrocytes. How can subunit produced in excess be determined?	2
18.	Describe the principle that underlie the BLAST search?	2
19.	Which information can be retrieved from the following databases?	2

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	i) EMBL ii) PDB OR (a) Which database was created to manage the redundancy in EST data? (b) What is the role of the curator in Bio-informatics.	
20.	Differentiate between infinite and finite cell lines.	2
21.	Describe somatic hybridization(parasexual hybridization) with a suitable example digramatically.	2
22.	A fungal extract has anticancer potential and it has shown positive results in clinical trials against childhood leukaemia. However, the active compound is present in very low concentration. Suggest any two ways to increase its production. OR What are the benefits of microbial culture collection centre? Name a culture collection centre in India and its location.	2
23.	Indicate what A, B, C, D, E and F are in following table:	2

S.No.	Products	Produced in animal cells	Medical application
1.	A	CHO Cells	Acute myocardial infarction
2.	Erythropoietin	B	C
3.	Blood clotting factor VIII	CHO cells	D
4.	E	F	Treatment of breast cancer

24.	How does the metagenomics approach helps to identify novel genes present in the environment? Explain the process.	2
25.	Why animal cells in a culture medium are placed in CO2 incubator instead of a regular incubator?	2
	SECTION C	
26.	Give reasons for the following: i) Methionine222 was substituted by alanine through site directed	3

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	mutagenesis in subtilisin gene. ii) Kappa casein is involved in micelle stabilization of milk proteins. iii) whey protein detoxifies xenobiotics	
27.	Give the principle and working of the technique invented by Kary Mullis in 1983 in order to amplify a specific DNA sequence. OR Write a short note on RFLP and indicate one of its important application	3
28.	Differentiate between polyclonal and monoclonal antibodies. Which type of antibody is used therapeutically? Briefly describe its use.	3
29.	Considering the impact of biotechnology in our lives, write any three application of plant genetic engineering.	3
30.	How does structural genomics differ from functional genomics?	3
	SECTION D	
31.	What is 2D gel electrophoresis? Explain the principles behind 2D gel electrophoresis along with suitable diagram. OR Chymotrypsin is secreted as Chymotrypsinogen. How is this enzyme converted into active form? Explain how the correct folding of enzyme, chymotrypsin leads to its proteolytic function. Name two more enzymes which work on the same mechanism.	5
32.	Differentiate between Fed Batch and Continuous microbial culture, along with well-defined graphs for them. OR What are culture collection centers? Why culture collection centres are so important for investigators? Give names of any two such culture collection centres found in India.	5
33.	Explain the method for the selection of recombinants that makes use of insertional inactivation, with the help of suitable diagram. OR Explain various steps involved in a recombinant DNA technology experiment.Name any two molecular biologists who helped to create the first r-DNA molecule.	5

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