APEEJAY SCHOOL, SHEIKH SARAI

FIRST TERMINAL EXAMINATION, 2019-20 SS-47

CLASS-XII

BIOTECHNOLOGY

Time allowed : 3 Hrs. M.M. : 70

General Instructions :

(i) All questions are compulsory.

(ii) There is no overall choice. However, internal choice has been provided. You have to attempt only one of the choices in such questions.

(iii) Questions No. 1 to 15 are very short answer questions, carrying 1 mark each.

(iv) Questions No. 16 to 22 are short answer questions, carrying 2 marks each.

(v) Questions No. 23 to 29 are also short answer questions, carrying 3 marks each.

(vi) Questions No. 30 to 33 are long answer questions, carrying 5 marks each.

(vii) Use of calculators is not permitted. However, you may use log tables, if necessary.

SECTION–A

1. A recombinant DNA molecule is produced by joining together
   (a) one mRNA with a DNA segment
   (b) one mRNA with a tRNA segment
   (c) two DNA molecules from different sources
   (d) two RNA molecules from different sources.

2. A gene produced for recombinant DNA technology contains a gene from one organism joined to the regulatory sequence of another gene. Such a gene is called
   (a) oncogene
   (b) junk gene
   (c) chimeric gene
   (d) pseudogene

3. To be useful in the preparation of recombinant DNA, a plasmid must have
   (a) No origin of replication
   (b) An origin of replication
   (c) The ability to alternate between the linear and circular forms
   (d) Restriction endonuclease activity

P.T.O.

4. Restriction endonucleases have the ability of cutting
   (a) DNA at random sites
   (b) DNA at specific sites
   (c) Both a and b
   (c) DNA and RNA at random sites

5. RFLP is
   (a) restriction fragment length polymorphism
   (b) repeated fragment length polymorphism
   (c) renewed fragment length polymorphism
   (d) required fragment length polymorphism

6. A radio active probe used in DNA finger printing contains
   (a) 32 p
   (b) 14 C
   (c) 12 N
   (d) pUC18

7. Electrophoresis, a technique used in DNA fingerprinting helps to separate
   (a) DNA segments
   (b) cells from DNA
   (c) Tissues
   (d) RNA from DNA

8. The genes introduced through somatic cell gene therapy are
   (a) heritable
   (b) non-heritable
   (c) partially heritable
   (d) none of these

9. Glucose is added to the tissue culture media as
   (a) growth regulator
   (b) carbon source
   (c) solidifying agent
   (d) an antibiotic

10. Explant is
   (a) any cut part of the plant used in tissue culture

(b) a plant extract used in tissue culture

(c) a source of growth regulators added to media

(d) solidifying agent

11. What is the relationship between specific activity and purity of a protein ?
12. Metagenomic approach is of immense use to scientists. How ?
13. What is lyophilization ?
14. Why is a DNA sequence always listed in the direction 5 to 3 direction ?
15. Which two properties makes virus good vectors ?

SECTION–B

16. Write four precautions one should take, to maximize protein stability during various purification steps.

OR

Recombenant insulin is produced at 100mg/L by E coli at a cell concentration of 1 g/L. Calculate the volume of reator needed to produce 1 kg of insulin in the following conditions:

(a) When the cell concentration is 1 g/L and insulin production is 500 mg/L.

(b) When cell concentration is 50 g/L and insulin production is 100 mg/L.

17. On a large scale culturing of microbes, the sources of nutrients used in the medium are different from that of a small scale culture. Why ? Name any two sources of nutrients for a large scale culture.
18. CO_2 incubators are used to grow animal cells in culture rather than regular BOD's. Why ?

OR

Give two features to distinguish finite cell lines and continuous cell lines.

19. Indicate the use of the following in microbial cell culture :

(a) olive oil

(b) baffle flask

(c) urea

(d) agar

20. r-HuEPO is preferred over blood transfusion in persons with blood loss. Why ?
21. Why is inverted microscopes used instead of compound microscope in observing animal cells in culture ?

OR

Foaming is a problem in most microbiological processes. Mention any two possible causes of this problem. How can it be controlled ?

22. Karyotype determination of animal cell culture is important. Why ? What factors affect its stability ?

OR

Why is it difficult to culture animal cells as compared to plant cells ? Why is it essential to supplement animal cell culture media with serum ?

SECTION - C

23. Name three enzymes used in cloning and write one function of each.
24. What is the use of adding subtilisin to the laundry detergents ? Why and how is the wild type subtilisin changed to the improved one which is used in detergent nowadays ?
25. Describe the important parts of a mass spectrometer with diagram. Why has this technique become important in studying proteins.
26. What is Molecular Pharming ? Write any four advantages of expressing transgenic proteins in milk.

OR

With an example illustrate :

(a) a blunt end cutter restriction enzyme

(b) a sticky end cutter restriction enzyme

Which type of ends are better and why ?

27. What are monoclonal antibodies ? How hybridoma technology has been used to produce monoclonal antibodies at commercially feasible level ?
28. It is difficult to raise hybrids which are interspecific and intergeneric. Why ? How can these types of hybrids be obtained ?

OR

Describe the use of the following in an animal cell culture laboratory :

(a) LAF hood

(b) Inverted microscope

(c) Microcarrier beads

29. What kind of analysis can be done using Bioinformatics tools for DNA and proteins ?

OR

The publication of Atlas of Protein Sequence and Structure under the editorship of Margaret O. Dayhoff was a pioneering effort. Why ?

SECTION - D

30. What is in-situ activation of chymotrypsinogen ? Explain how the correct folding of the enzyme chymotrypsin leads to its function as a proteolytic enzyme.

31. (a) 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.

(b) Explain any two methods of measuring microbial growth.

(c) In which phase of growth is the specific growth rate of microbial cells calculated ? On what factors does the specific growth rate depend ?

OR

What are neutraceutical proteins ? Why is curd considered pro-biotic ? Whey is a neutraceutical protein. Justify.

32. (a) Even minor genetic variations in the coding regions of genes underlie differences in our susceptibility to or protection from all kinds of diseases. What are these genomic variations called ? Explain with an example such variations, associated with any disease.

(b) Give two more applications of such variations present in the non-coding region of the genome.

33. Expand the term BLAST. Discuss the steps involved in comparison of DNA sequences using this tool.

PRE BOARD (2019-20)

CLASS- XII

BIOTECHNOLOGY

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General Instructions

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2. Question numbers 1 to 15 are very short answer questions, carrying 1 mark each.
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Section A:- 1 mark each

Q1. Define chemostat and turbidostat?

Q2. What is gene knock out?

Q3. Name any two culture collection centers in India?

Q4. What is the source of Agar?

Q5.What is contact inhibition?

Q6. Name one dye commonly used to stain proteins

Q7. Name any one synthetic medium used in plant cell culture?

Q8. The term Roundup Ready is coined to denote which of the following?

a) Herbicide
b) Insecticide
c) Antigenic substance
d) A transgenic plant

Q9. Which of the following is not a genetic disease?

a) Cystis fibrosis
b) Sickle cell anemia
c) Malaria
d) Hemophilia

Q10. On which cell lines recombinant erythropoietin was produced?

a) HeLa
b) Kb
c) CHO
d) None of these

Q11. Which of the secondary metabolite is antimalarial?

a) Quinine
b) Artemisin
c) Both a and b
d) None of the above

Q12. Who discovered first somatic embryogenesis?

a) E Cooking
b) F. C. Stewart
c) Hamberlant
d) Gottlieb

Q13. Who used the term genomics first?

a) H. Winkler
b) Thomas Roder
c) NCBI
d) None of the above

Q14. Who carried out first peptide mapping of haemoglobin?

a) S. B. Prusiner
b) Karas and Hillenkamp
c) J. J. Thomson
d) V. A. Ingram

Q15. F. Boliver and R. Rodriguez discovered which of the following plasmid?

a) pUC19
b) pWWW
c) Ti DNA
d) pBR322

Section B:- 2 marks each

Q16. Explain the principle of Mass spectrometry?

Q17. What do you understand by the term Restriction-Modification system?

Q18. Why is Bt cotton insect resistant? Suggest two advantages of growing Bt crops?

Q19. How do metagenomics approach help to identify novel genes present in the environment? Explain the process.

Q20. Why is sickle cell trait been selected in populations where malaria is endemic? What is the molecular basis of sickle cell anemia?

Q21. Explain site-directed mutagenesis with one application?

Q22. Patients who are administered OKT3 do not suffer from an acute renal allograft rejection. Why?

SECTION C:-3 Marks each

Q23. Expand BLAST and explain what is BLAST? Describe the principles that underlies BLAST search.

Q24. Draw a well labeled diagram of southern hybridization and state any one of its application?

Q25. What is downstream processing? Draw a flow diagram for extraction of extracellular proteins.

Q26. Outline the process of creation of chimeric mouse by embryonic stem cell culture.

Q27. Explain the use of following instruments with respect to animal cell culture

a) Inverted microscope
b) Laminar air flow
c) CO_2 incubator

Q28. Explain Replica plating method of recombinant selection with diagram.

Q29. Explain any three methods of direct gene transfer in cell.

SECTION D:-5 Marks each

Q30. What are monoclonal antibodies? How are they different from polyclonal antibodies? Explain hybridoma technology. How do OKT-3 help in organ transplantation and what is the role of herceptin in breast cancer treatment.

Q31. Why is sickle cell anemia called as molecular disease? Name the techniques used to diagnose it and explain any one with the help of a diagram. Why is it considered beneficial for African population?

OR

The enzyme chymotrypsin is inactivated by organophosphates. Why? How is this enzyme able to catalyse the hydrolysis of proteins? Indicate the mechanism of action with diagram.

Q32. A) Why is Sanger's method called as chain termination method?

B) Expand SNP. Why is it considered important for physicians for prescribing any drug to patients and its further following? Explain SNP technique.

Q33. Write short note on the following:

a) Organogenesis
b) Protoplast culture
c) Artificial seeds
d) Edible vaccines
e) Golden rice