

SAMPLE PAPER - I 2024-2025

SUBJECT - BIOTECHNOLOGY

CLASS - XII

Time - 3Hrs

GENERAL INSTRUCTIONS

Max M-70

Question paper consists of five sections A, B, C, D and E

SECTION A consists of 16 questions of 1 mark each.

SECTION B consists of 07 questions of 2 marks each.

SECTION C consists of 07 questions of 3 marks each.

SECTION D consists of 02 Case based questions of 4 marks each.

SECTION E consists of 03 questions of 5 marks each.

SECTION A

1. The first vector used in first cloning experiment involving mammalian cells. (1)
a) Simian Virus 40 b) Simian Virus 50 c) TMV virus d) CMV
2. Who developed the technique to isolate and grow human ES cells in culture. (1)
a) Clive James b) James Thomson c) Paul Berg d) Stanley Cohen
3. Nerve gas used in world war had the compounds of. (1)
a) Valine alkylating compound b) Serine alkylating compound.
c) Tryptophan compound d) Histidine compound.
4. The enzyme used in beverage industry. (1)
a) Alcalase b) Papain c) Chymosin d) Isomerase.
5. Somatic embryogenesis was ^{first} reported and done in (1)
a) Carrot culture b) potato culture c) Tomato culture
d) Cotton culture.
6. Information about the three dimensional structure of proteins can be provided in database of. (1)
a) EMBL b) GENSCAN c) PALI d) PDB.

7. A protein with molecular weight of 20,000 contains four charges. The protein ions detected by mass spectrometer is

- 1) 5001 2) 4001 3) 6688 4) 10001

8. Which proteomics can be used to identify and analyze protein network in nuclear pore complex.

- a) Expression proteomics b) Functional proteomics
c) Structural Proteomics d) Proteome mining.

9. What is the generation time of a bacterial population in which bacterial number increases from $10^4/\text{ml}$ to $10^7/\text{ml}$ during four hours of exponential growth.

- a) 24 minutes b) 20 minutes c) 30 minutes d) 40 minutes.

10. Peptide hormones are produced in which part of transgenic maize plant.

- a) Leaves b) Stem c) Seed endosperm d) Roots.

11. The pH indicator used in the medium for culturing animal cells.

- a) Phenolphthalein b) Phenol red c) Phenol yellow
d) Safranin

12. The absence of which enzyme leads to SCID.

- a) Decarboxylase b) Hexokinase c) Adenosine deaminase
d) Adenosine deoxygenase.

13. Assertion and Reason

- a) Both A and R is correct and R is the correct explanation of A
b) Both A and R is correct but R is not the correct explanation of A
c) A is true but R is false.
d) A is false but R is true.

13. Assertion A — Foaming is a problem in most microbiological culture.
Reason R — It is caused due to proteins in nutrient media.

14. Assertion A — The most commonly used bioreactor are of stirring type.
Reason R — The stirrer facilitates even mixing and O_2 availability throughout bioreactor.

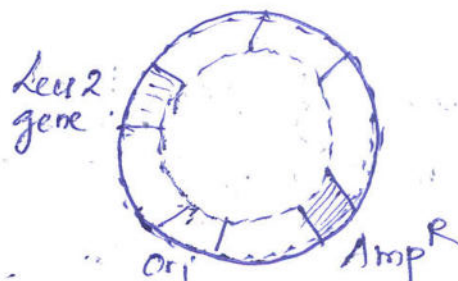
15. Assertion A — Flavr Savr a transgenic tomato remains fresh and retains their flavor for long time.

Reason R — Production of polygalacturonase degrades pectin, was blocked in Flavr Savr.

16. Assertion A — Cosmids have been constructed by combining features of plasmid and cosmid of phage.
Reason R — Cosmid vectors can clone DNA fragments upto 20 kb in size.

SECTION B.

17.



Name the vector given above. How does it differ from pBR322. State the features of vector that can be used in rDNA technology.

18. What are nutraceutical proteins. Explain the use of whey and curd for treating various diseases.

OR.

Why is sickle cell anemia called molecular disease. How can sickle cell Hb be identified. Explain by flow sheet diagram.

19. What is nick translation? Explain the importance of SNP and its application. (2)

20. State the ~~types and~~ uses of the following in microbial cell culture.

- a) Shakers b) Baffle flask c) Small scale fermentors. (2)
d) WAF

21. In plants how can the following be produced.

- a) Male sterile plants b) PHB. (2)

SECTION C

22. How are ES cells derived? Explain with diagram the production of chimeric mice using ES cells. (3)

23. Explain the production ^{and use} of the following ~~by~~ ^{by} diagrams in animal cell culture (3)

- a) Monoclonal Ab b) tPA c) OKT 3

OR.

Explain the use of the following in animal cell culture.

- a) CO₂ incubator b) Inverted Microscope c) low speed centrifuge (3)

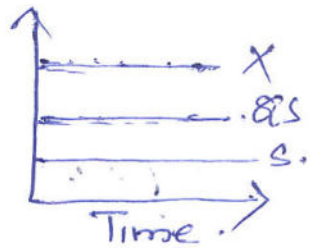
24. What are the limitations of germ plasma conservation through conventional method. ^{Explain} How can these problems ^{be} surpassed? (3)

25. ~~The~~ Explain the importance and production of the following transgenic plants. (3)

- a) Golden rice b) Pest resistance plant c) Herbicide tolerant plants.

26. ^{with diagram} Explain how metagenomic approach helps to identify novel genes? What are the different methods to improve strains for various biotechnological purposes? (3)

27.



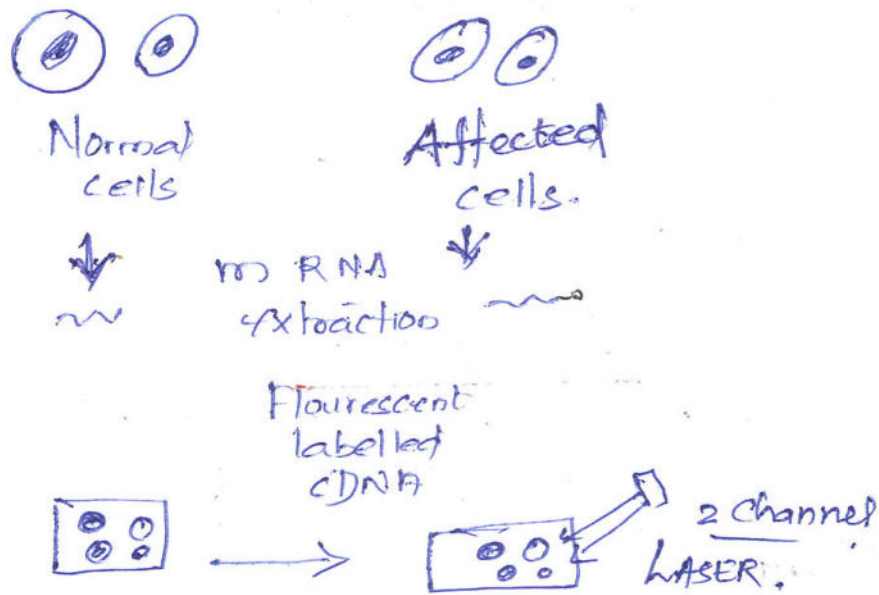
What does the above graph depict? Explain the different types of ^{microbial} culture with graph.
 Why is it better than others.

28. Expand BLAST and NCBI. State the principle of BLAST. What are the tools available in NCBI. Write the role of curator.

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Case Based Study.

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- a) What does the above figure represent?
- b) State the principle of it.
- c) What is procedure and any two applications of it.

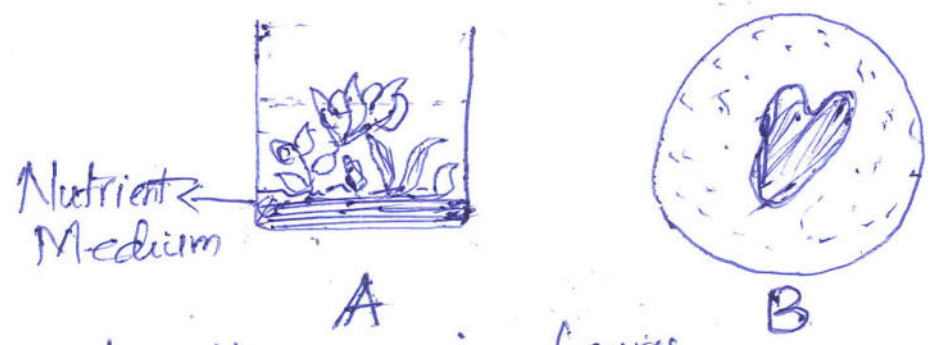
OR.

Expand FISH. Explain ^{with translation} by an example.

30.

Plant cell cultures offers many potential applications in agriculture and health care. Vegetative propagation of plants is of great importance in horticulture and forestry. Plants can be genetically engineered to produce transgenic plants to produce desired characters.

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- a. In the given figures what does A and B represent? How are A and B produced?
- b. How are single cells and protoplast isolated?
- c. What are secondary metabolites? Write the plant source and uses of the following
 a) Digoxin b) Quinine c) Taxol
- OR.
- How are virus free plants produced? Are they virus resistant?

SECTION E

31. Why are ddNTPs used in sequencing. Briefly explain the principle and steps of DNA sequencing. Write the structure of ddNTP OR
- How can specific region of DNA molecule be amplified? State the principle, steps with the help of diagram. Write any two uses of it.
32. What is the principle of MALDI-TOF? Explain the parts and uses of mass spectrometer. OR
- What are the steps involved in generating a peptide map a) state the principle of 2D gel electrophoresis.
- b) How does charge relay system operate? Why does proteolytic enzyme do not cut cellular proteins within pancreas.
- c) State the importance of the following
 a) BCAA b) Subtilisin

(5)

(5)

33 What is down streaming process? With the help of flow sheet explain how ^{Recombinant} insulin is produced from E. coli

OR.

Answer the following.

- a) Eucaryotic genes cannot be expressed in prokaryotic host.
- b) *Pichia pastoris* is better than *Saccharomyces cerevisiae* for expressing eucaryotic gene.
- c) Regulation of pH is important in animal cell culture.
- d) M13 phage is a major vector used in rDNA.

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