Sample Paper – 2008
CLASS – XII
Subject - Biotechnology

Time: 3Hrs **Max. marks: 70**

General Instructions

i. *All questions are compulsory.*

ii. *There is no overall choice. However, an internal choice has been provided in one question of **3**marks and three questions of **5**marks. You have to attempt only one of the choices in such questions. Question Paper contains four sections – A, B, C and D.*

iii. *Question numbers 1 to 5 are very short answer questions, carrying 1 mark each.*

iv. *Question numbers 6 to 15 are short answer questions, carrying 2 marks each.*

v. *Question numbers 16 to 25 are also short answer questions, carrying 3 marks each.*

vi. *Question numbers 26 to 28 are long answer questions, carrying 5 marks each.*

SECTION-A

1. Name two diseases caused by the absence of a protein. Thallasaemia,
2. Name the phenomenon of invitro heat treatment of meristem.
3. What is the single letter IUPAC code for?
   a.Tryptophan.
   b.Serine
4. In which phase specific growth rate is measured in microbial culture?
5. What is source of Tag polymerase?

SECTION-B

6. Who first developed the protein sequencing method? Name the protein to be sequence first. Sanger. Isulin was the 1st protein 2 b sequenced.
7. What is a restriction enzyme? Write the types of restriction enzyme. Those enzymes which restrict the growth of any forein body [virus, DNA] in a bacterial cell are called restriction enzymes.
8. An E.coli cell produces at least 1000 different proteins. One of these is an enzyme of interest produced at a level of 2000 molecules per cell under optimum condition.

If we have to purify 1g of this intracellular enzyme estimate how many cells of bacteria will be required theoretically. Given mass of enzyme of interest is 100000 Dalton.

9. What is DNA micro array technology? What is the importance of this technology?
10. What is downstream processing? Write the steps of isolation of extra cellular microbial metabolites?
11. Explain the method of producing transgenic plant with delayed fruit ripening.
12. T-cells reject transplants. How is kidney transplantation successfully done? OKT3
13. How does Agro bacterium tumifaciens transfer the desired gene in to plants?
14. What do you mean by non covalent interaction? Name the 4 types of non covalent interaction.
15. What are DNA library & genomic library?

SECTION-C

16. What are the principles between isoelectric focussing & SDS PAGE technique? Why is two dimensional electrophoresis better than one dimensional electrophoresis?
17. Differentiate between the characteristics of normal cells & cancerous cells?
18. Suggest 3 methods of preserving microbial strains.
19. What is the principle of MALDI-TOF? What is its main use in protein studies?
20. What are data retrieval tools? Write entrez map showing the hard link relationship between database?
21. What does PCR stands for? What are the different steps in PCR reaction?
22. Define the following:
    a. Bioremediation.
    b. Plasmid.
    c. Database.
23. What is site directed mutagenesis? Indicate its application?
24. A bacterial culture containing 100cells increased its population to one billion in 10 hours. Determine
    a. The no. of generations.
    b. The generation time.
25. What is micro projectile bombardment? What advantage does this process have in vector less gene delivery?

SECTION-D

26. Describe the structure function relationship in proteins giving example of chymotrypsin or sickle cell anemia?
27. What are cloning vectors? Give an illustrated account of different bacterial plasmid as cloning vectors?
28. What is gene prediction & gene counting? Write gene prediction algorithms.

OR

Write short note on

a. Nick translation
b. SNPs.

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

SECTION A

1. Give the sequence of the two primers (5 nucleotides long) required to amplify the following DNA sequence by PCR :

5' GCACCTAGATCGATCC 3'

2. What is lyophilization ?

3. Why is the nutrient medium autoclaved before using it for culturing microbes?

4. Which future vaccine holds promise of bypassing the need to visit the doctor regularly for childhood immunisations ?

5. Why is 'Golden rice' nutritionally superior to normal rice?

SECTION B

6. You wish to introduce the human insulin gene into a bacterial host in the hope of producing large amounts of human insulin. Should you use genomic DNA or cDNA ? Explain.

7. What are ESTs ? How are they useful in genome analysis ?

8. Which of the following proteins would be expected to migrate fastest through SDS-PAGE gel, and why ?

Protein	*MW (daltons)*
Transferrin	90,000
Cytochrome c	13,400
α-antitrypsin	45,000
Myoglobin	17,000
Serum albumin	69,000

9. Give two distinguishing features of pBR322 and BAC vectors.

10. How can SNPs be used to predict susceptibility to diseases ?

11. Why are type II restriction endonucleases (RE) extensively used in recombinant DNA technology ? Why do bacteria make RE ?

12. What is the IUPAC code for T or C ? Write the complementary sequence of the following sequence :

5' - A T G A Y C G B T - 3'

13. rythropoietin (EPO) is included in the list of banned substances for sportsmen. What is this substance ? How does it act ?

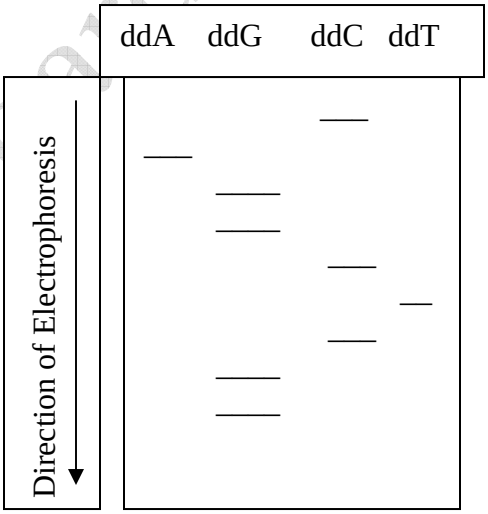
OR

Embryonic cells during development not only commit along different lineages but also retain a population of cells that are present only at strategic locations in the adult organism. Name these specialized cells and why they are maintained in undifferentiated state?

14. An autoradiogram of a sequencing gel containing 4 lanes of DNA fragments is shown in the figure below :

(a) Read the DNA sequence from the autoradiogram.

(b) Explain why the sequence read from the autoradiogram is complementary to the original sequence.



15. Study the following enzyme purification table and answer the questions that follow:

Step	Procedure	Total protein (mg)	Activity (units)
1.	Crude extract	20,000	4,000,000
2.	Precipitation (salt)	5,000	3,000,000
3.	Precipitation (pH)	4,000	1,000,000
4.	Ion exchange chromatography	200	800,000

(a) Which step in the purification is most effective, and why ?
(b) Which of the procedures is least effective and why ?

SECTION C

16. What is OKT-3 ? Why is it administered to patients undergoing organ transplantation ? What is the relevance of fusing an antibody producing B-cell with myeloma cells in hybridoma technology ?

17. What is 'Molecular Pharming' ? Suggest any four advantages of expressing transgenic proteins in milk ?

18. Name any three resources available from the NCBI and their uses.

19. What is fed-batch culture and what are its benefits in microbial technology ? How is it different from a batch culture ?

20. Name the special DNA polymerase used in PCR reactions. What are the three basic steps of a PCR cycle ?
Using a single template molecule, how many DNA molecules are generated after 10 cycles of amplification ?

21. Suggest any four reasons why complete genome sequencing projects should be undertaken ? Describe the advantage of using bacterial artificial chromosomes (BAC) in such sequencing programmes.

22. What is downstream processing ? What strategy would you use to purify a recombinant protein that is secreted into the growth medium ?

23. Name any four physical and/or chemical properties of enzymes which might be useful to change by site-directed mutagenesis. Support your answer by taking an example of an engineered protein/enzyme.

24. Explain how DNA "microarray" technique can be used to study cellular response to environment. Also depict major steps diagrammatically.

25. A Chronic Myelogenous Leukemia (CML) patient has been put on a combination drug therapy for the past 2 months. How can the FISH technique be used to monitor the effect of chemotherapy ?

SECTION D

26. (a) What is the principle of protein fingerprinting ? Illustrate major steps.

(b) Who developed this technique ?

(c) What are prions ?

27. (a) How will you select bacterial cells carrying a recombinant plasmid ?

(b) Explain briefly a technique for visual screening of transformed bacteria.

(c) How can *E. coli* cells be made competent and who developed this method ?

OR

(a) Enlist the four major steps in a recombinant DNA experiment.

(b) What is the advantage of having a polylinker in a cloning vector ?

(c) Name a cloning vector that can be used to clone large DNA fragments (> 1 MB).

28. (a) Describe vector-mediated and vector-less gene transfer in plants.

(b) Why is Agrobacterium tumefaciens regarded as nature's genetic engineer ? 5

OR

(a) Enlist the six major steps in plant tissue culture.

(b) Name a medium commonly used for culturing plant parts and what factors dictate the choice of media.

Contributed By:

Sad_iq_perfect