Question Paper Outside Delhi 2017 set 1

CBSE Class 12 Bio – Technology

General Instructions:

- All questions are compulsory.
- There is no overall choice. However, an internal choice has been provided in one question of 3 marks and one question of 5 marks. You have to attempt only one of the choices in such questions.
- Questions No. 1 to 6 are very short answer questions, carrying 1 mark each.
- Questions No. 7 to 14 are short answer questions, carrying 2 marks each.
- Questions No. 15 to 25 are also short answer questions, carrying 3 marks each.
- Questions No. 26 to 28 are long answer questions, carrying 5 marks each.
- Use of calculators is not permitted. However, you may use log tables, if necessary.

1. Proteome of a given cell is dynamic. Why?

Ans. Proteome of a given cell is dynamic because in response to internal & external changes the biochemical machinery of the cell could be changed.

2. What is lyophilization?

Ans. Freezing of a culture followed by drying under vacuum.

3. Why is a pan of water always kept in an incubator chamber, used for animal cell culture?

Ans. Osmolality within a cell is 300 m and therefore has to be maintained for- high humidity, preventing desiccation of culture medium, maintenance of correct osmolarity (Any one).

4. While growing animal cells in a laboratory, osmolality of medium is always maintained around 300 m Osm. Why?

Ans. Cells will otherwise shrink or swell, cell growth/function will be affected.

5. Why is a DNA sequence always listed in the direction 5' to 3'?

Ans. DNA is biologically synthesized in the 5'- 3' direction.

6. Name the scientist who established the first human cell line from cervix cancer cells.

Ans. George Gay.

7. Choice of vector is crucial for a r-DNA experiment. Give two reasons for the same.

Ans. (i) Depending on insert size.

(ii) Nature of the host.

8. Why is r-HUEPO preferred over blood transfusion in a person with blood loss due to accident?

Ans. No donor is required for transfusion, no transfusion facilities, no risk of transfusion related infection (any two).

9. (a) How do bacteria protect themselves from infection by bacteriophages?

(b) Why are only type-II restriction enzymes used in r-DNA technology?

Ans. (a) Using restriction enzymes; Restriction enzymes will not cut own chromosomal DNA.

(b) Type II restriction enzymes cut within the recognition sequence.

10. Draw a labelled diagram of a synthetic seed.

Ans.

11. Curd and whey are categorised as nutraceutical proteins. Why?

Ans. Curd and whey are rich sources of nutrients- essential amino acids etc. and have pharmaceutical compounds which elevate glutathione which detoxify xenobiotics.

12. The number of genes predicted by computational biology is different from the number of genes identified by experimental methods in a genome. Justify.

Ans. (a) existence of overlapping genes and spliced variants.

(b) incorrect prediction due to use of experimentally identified genes.

13. How can 'Expression Proteomics' be useful in the identification of disease specific proteins?

Ans. Protein expression between different samples can be compared for differential protein expression using 2-D gel electrophoresis, mass spectrometry etc.

14. Why is it essential to supplement animal cell culture media with serum?

Ans. Serum provides growth factors, nutrients, lipids, and other factors to support cell proliferation and attachment to culture vessel.

15. How can microbial cultures be exploited for commercial purposes?

Ans. Production of food, vaccines/ Production of primary metabolites : acids, alcohol/ Production of secondary metabolites: Antibiotics/ Biotransformation reactions: Enzymatic, steroids.

16. Differentiate between primary and secondary metabolites. Name any two secondary metabolites obtained by plant tissue culture.

Ans. Followings are required

- Primary metabolites are chemicals used for basic metabolic processes in plants such as sugars, lipid, amino acids.
- Secondary metabolites are additional products with useful properties.

17. It is difficult to raise hybrids which are interspecific and intergeneric. Why? How can these types of hybrids be obtained?

Ans. Following statements are needed:

- Because of abnormal development of endosperm which can cause premature death of the hybrid embryo.
- Embryo rescue technique/Embryos are excised at appropriate time and cultured on suitable nutrient medium.

18. Differentiate between genomic and c-DNA library. Mention three major points.

Ans.

Genomic Library	cDNA Library
All possible DNA sequences included.	mRNA is the starting material.
Large size of DNA library.	Small size.
Both coding and non coding DNA included.	Only coding part of DNA is used.

19. What are the three main features that a vector should possess ? Describe the role of each.

Ans. Followings are needed:

- It must have 'ori' for independent replication in host.
- Selectable markers to identify host cells undergoing transformation with vector.
- small in size for easy transfer into host.
- Multiple restriction sites.

20. Give a schematic representation about generation of RFLPs. What is the principle behind the generation of RFLPs?

Ans. DNA isolated from an individual organism has unique sequence and even members within a species differ in some part of their sequence, providing fragments of different sizes when digested with a given enzyme.

21. Enlist three reasons to support the statement "Edible vaccines have advantages over recombinant vaccines".

Ans. Edible vaccines are better because-

- Easy delivery through oral route
- Low cost
- No storage problem

22. Describe any three non-covalent interactions involved in organising the structure of proteins.

Ans. (a) Ionic bond: Interactions between oppositely charged groups of a molecule. Ionic interactions are also known as salt bridges.

(b) Hydrogen bond: formed by sharing of hydrogen atoms between two electronegative atoms such as nitrogen and oxygen.

(c) Van der Waals forces: forces of weak attraction which occur between atoms at close range.

(d) Hydrophobic interactions: the tendency of hydrophobic (water hating) molecules to come together in order to repel water.

23. Draw a flow chart for isolation of an intracellular microbial metabolite, using an example.

Ans. recombinant insulin.

24. 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. Day off was a pioneering effort. Why?

Ans.

- Processing raw information.
- Gene prediction.
- Protein sequence inference.
- Regulatory sequences – identification.
- making phylogenetic relationships
- Making gene discovery

OR

Include the pioneering role in development of computer methods for the comparison of protein sequences.

25. Describe the use of the following in an animal cell culture laboratory:
(a) LAF hood
(b) Inverted microscope

(c) Microcarrier beads

Ans. (a) LAF: Work area to be free of contamination.
(b) Inverted microscope: Allows cells at bottom of culture vessel to be visualized.
(c) Micro carrier beads: Increases surface area in scaling up of adherent cultures.

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

Ans. Activation at the site of function. Chymotrypsinogen is acted upon by trypsin enzyme which results in activation of the enzyme and interaction with substrate.

Mechanism of action:

- Nucleophilic attack of serine O-H ie O- on carbonyl group of peptide bond to form a tetrahedral complex.
- Breakage of peptide bond by water and release of one product.
- Addition of water, second substrate.
- Acyl enzyme complex breaks giving rise to second product.

27. Expand 'BLAST'. Discuss the steps involved in comparison of DNA sequences using this tool. Differentiate between paralogs and homologs.

Ans.

- Basic Local Alignment Search tool.
- A given sequence is compared with sequences in the data base using substitution matrices that specify score to either reward or penalize. Top scoring matches are ranked according to set criteria that serve to distinguish between a similarity due to ancestral relationship or due to random chance. True matches are further examined thoroughly with other details accessible through Entrez and other tools available at NCBI.

- Paralogs: Duplicated genes within genomes which have similarities but duffer in function.
- Homologs: Descended from common ancestor and have same function.

28. (a) Calculate the generation time of a bacterial population in which the number of

bacteria increases from 104/ml to 107/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

Suggest a genetic engineering strategy for each of the following traits in transgenic crops:
(a) Herbicide tolerance
(b) Insect resistance
(c) Abiotic stress tolerance
(d) Virus resistance
(e) Delayed ripening

Ans. (a) n=3.3 (log107 –log 104) = 3.3 (3) =10
t= 240/ 10= 24 min
(b) ATP measurement; measure number of viable cells; dry weight; turbidity measurement. (Any two)
(c) log phase: specific growth rate depends on temperature, pH, medium composition, and levels of dissolved oxygen.

OR

(a) Herbicide tolerance: Over production of herbicide target enzymes/ introduction of a modified gene that encodes for a resistant form of herbicide target enzyme into crop plants.
(b) Insect resistance: Cry genes from Bacillus thuringienesis which are specific to particular group of insect pests are introduced into plants.
(c) Developing transgenic plants which over express the genes for one or more stress related osmolites like mannitol, amino acids, anti freeze proteins etc.
(d) Genes from viral coat proteins are introduced into plants to make them viral resistant.
(e) Hormone ethylene causes fruit ripening. By blocking or reducing ethylene production/antisense RNA ripening is delayed. When ripening is required then ethylene can be applied.