

DEPARTMENT OF BIOTECHNOLOGY
M.Sc. SEMESTER I ONLINE EXAMINATION, 2021
Paper Title : ESSENTIALS OF GENETIC ENGINEERING
Paper Code – MBT-CC103

Time : Three Hours

Maximum Marks : 75

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams.

Question No. 1:

A. Choose the correct option for the following questions:

[5 X 1 = 5]

1. Conjugation can't take place between_____
 - a) F⁻ and F⁺
 - b) F' and F⁻
 - c) HFR and F⁻
 - d) HFR and F⁺
2. Which of the Mendel's laws will be violated by linkage?
 - a) Panspermia
 - b) Dominance
 - c) Segregation
 - d) Independent assortment
3. What is a genomic library?
 - a) a collection of recombinant molecules with inserts that contain all of the gene of an organism.
 - b) a collection of recombinant molecules with insert that contains all of an organism genome.
 - c) a collection of recombinant molecules that express all of the gene of an organism.
 - d) a collection of recombinant molecules that have been sequenced.
4. Which of the following RNAs can induce gene silencing?
 - a) miRNA
 - b) snoRNA
 - c) ssRNA
 - d) ncRNA
5. Which of the statement is true for pBR322?
 - a) It contains only an ampicillin resistance gene.
 - b) It contains both ampicillin resistant and tetracycline resistant gene.
 - c) The cloning site is present only in the ampicillin resistant gene.
 - d) It is a natural vector.

B. Match the followings:

[5 X 1 = 5]

- | | |
|-------------------------|----------------|
| i. SARS CoV-2 | a. miRNA |
| ii. Transcriptomics | b. OPD |
| iii. Taq DNA Polymerase | c. RNA viruses |
| iv. Gene silencing | d. RT-PCR |
| v. ELISA | e. Microarray |

C. State whether True or False:

[5 X 1 = 5]

- i. PCR method is used for quantification of DNA.
- ii. ELISA method is more specific than Western blotting method to identify protein.
- iii. The enzyme reverse transcriptase is isolated from *E. coli*.
- iv. DNA protein interaction is studied by Southwestern blotting assay.
- v. Colony hybridisation method is same as Grunstein and Hogness method of screening the cDNA library.

Question-2

Attempt ANY TWO of the following:

[2 x 7.5 = 15]

- A. Explain the mechanism of miRNA mediated post transcriptional regulation in eukaryotes.
- B. What is a histone code and chromatin remodeling? Discuss in relation to epigenetics.
- C. Explain any one strategy of gene tagging. Give examples.
- D. Briefly explain the principle of inheritance of Quantitative traits with suitable examples.

Question-3

Attempt ANY TWO of the following:

[2 x 7.5 = 15]

- A. Affinity tags made recombinant protein purification easier – Discuss with two suitable examples
- B. What is 'generalized transduction'? How is it different from 'specialized transduction'? Enumerate different steps of generalized transduction in bacteria with suitable diagrams.
- C. Discuss different approaches one can adopt to monitor DNA-protein interactions. Critically enumerate the principles for each approach.
- D. Briefly describe the general characteristic of viruses. How viruses differ from prions.

Question-4

Attempt ANY TWO of the following:

[2 x 7.5 = 15]

- A. Write short notes on (i) Taq Polymerase (ii) Kinase (iii) T4 Ligase.
- B. Differentiate between expression vectors and cloning vectors with at least two examples from each. Describe with the help of a diagram pET vectors used in protein expression and purification.
- C. Define adaptors and linkers that are used in gene cloning. Explain their specific use in insert modification with diagrams.
- D. Describe RNA probe with emphasis on its application.

Question-5

Attempt ANY TWO of the following:

[2 x 7.5 = 15]

- A. Describe major types of Molecular markers. Explain each one with examples.
- B. Explain rDNA technology as a powerful tool in medicine. Describe its use in vaccine development with example(s) from current scenario.
- C. Differentiate between genomic library and cDNA library. Describe various methods of screening of cDNA library.
- D. Describe various methods of blotting? Differentiate between them with advantages and disadvantages on the application of the methods.

-oOo-

PLEASE NOTE

- You will be provided one hour additional time after exam for scanning and making PDF copy of the answer sheets.
- Email your PDF to biotechnologyexam2020@gmail.com
- Emails received after 2 PM will not be accepted for evaluation.