

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, JUNE 2022

SECOND YEAR [BATCH 2020-23]

MICROBIOLOGY (HONOURS)

Paper : X [CC10]

Date : 25/06/2022

Time : 11 am – 1 pm

Full Marks : 50

Answer **any ten** of the following questions:

[10×2]

1. a) Comment on the use of ALP in cloning of DNA.
- b) Write down the difference between linker and adaptor.
- c) State the role of RNase H in construction of cDNA library.
- d) How is the host genomic DNA protected from its own endonucleases?
- e) Write down the uses of isoschizomers.
- f) What is star activity?
- g) Write two applications of RDT in the field of medicine.
- h) The host range of a plasmid is determined by its *ori* region –explain.
- i) What are integrative plasmids?
- j) What are polylinker sequence? Why does it useful in gene cloning?
- k) Mention the function of hsdR, hsdM, and hsdS genes in *E.coli K12* strain.
- l) What are cosmid?
- m) What is constitutive promoter? Give example.
- n) Mention the typical features of any ideal reporter gene.
- o) What are Bifunctional vector? Give example.

Answer **any three** questions of the following:

[3×10]

2. a) Name one sticky end and one blunt end generating Restriction endonuclease. Schematically explain how they do this?
 - b) What is Klenow DNA polymerase and when is it used?
 - c) How would you minimize the self-ligation of Restriction endonuclease cut vector.
 - d) What type of vectors are used in construction of genomic library and why? [(2+2)+2+2+2]
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3. a) Give one example for each of the following enzyme indicating their utilities in RDT
 - i) Template independent DNA polymerase.
 - ii) RNA dependent DNA polymerase.
 - iii) Thermostable DNA polymerase.
 - b) A linear DNA molecule give five fragments of sizes 8.0, 7.4, 6.2, 4.5 and 2.9 kb when digested with EcoRI. BamHI cleaves the same DNA molecule into three fragments of sizes 12.9, 10.1 and 6.0 Kb. When EcoRI and BamHI are used together to digest the same DNA molecule, fragments of sizes 1.0, 2.0, 2.9, 3.5, 6.0, 6.2 and 7.4kb are produced. Draw a restriction map of this DNA molecule.
 - c) How do you distinguish the mode of action of T4 DNA ligase from that of *E. coli* DNA ligase?
 - d) What information do you get from colony hybridization technique? (3+3+2+2)

4.
 - a) Explain how does insertional inactivation of antibiotic resistance genes are useful for selection of pBR322?
 - b) What is alpha complementation? How does it useful in gene cloning process?
 - c) What are selectable marker? Give two example of it use for plant transformation process. [3+(1+4)+2]

5.
 - a) What is replicative form of M13 phage? How does it useful for making M13 based vector?
 - b) Explain how does thymidine kinase gene can be used as a selectable marker only when TK⁻ host cells are used for transformation?
 - c) How does LEU2 act as a nutritional marker in yeast related vector? [(1+3)+3+3]

6.
 - a) Explain how does coding sequences may markedly affect the level of foreign gene expression during recombinant experimental process?
 - b) How can lambda cI promoter be regulated during the clone gene expression in *E.coli* cells?
 - c) How does an IRES work in a Bicistronic vector? (3+4+3)

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