

Exam. Code : 206602

Subject Code : 8476

M.Sc. (Bioinformatics) Semester—II

CONCEPTS IN MOLECULAR BIOLOGY AND
rDNA TECHNOLOGY

Paper—BI-521

Time Allowed—3 Hours] [Maximum Marks—75

SECTION—A

Note :— Attempt *all* questions.

1. (a) Diagrammatically depict a phosphodiester bond in DNA chain.
- (b) What is the role of PCNA in DNA replication ?
- (c) Draw the structure of mRNA cap.
- (d) What are isoaccepting tRNAs ?
- (e) How does hypermethylation of DNA affect gene expression ?
- (f) What is the role of Signal Recognition Particle in protein translocation ?
- (g) What is meant by 'proofreading activity' of DNA polymerase ?
- (h) What is the role of restriction enzymes in a host ?

- (i) List the biochemical activities of Reverse Transcriptase.
- (j) What is the role of Taq DNA polymerase in cloning ? 1.5×10

SECTION—B

Note :-- Attempt *five* questions, *one* from each unit.

UNIT—I

2. (a) Draw a replication fork, label 5' and 3' ends, indicate leading and lagging strand and the direction in which the replication fork is moving.
- (b) How is mismatch repair carried out in *E.coli* ?
- (c) What is the role of topoisomerases in DNA replication ? 4+4+4
3. (a) Explain the repair pathways involved in repair of pyrimidine dimers.
- (b) Discuss the steps involved in initiation of replication in *E.coli*. 6+6

UNIT—II

4. (a) Discuss the role of promoter sequence in initiation of transcription in *E.coli*.
- (b) Describe the initiation of translation in prokaryotes. 6+6
5. (a) Discuss the rho dependent termination of transcription.
- (b) Describe the translocation of proteins into nucleus. 6+6

UNIT—III

6. (a) Discuss the mechanism of attenuation for regulation of tryptophan operon.
- (b) What is the role of cI gene product in lysogeny of phage lambda ? Explain. 6+6
7. (a) Explain the positive regulation of lac operon.
- (b) How do epigenetic effects regulate gene expression ? Explain. 6+6

UNIT—IV

8. (a) List the differences between type I and type II restriction enzymes.
- (b) Briefly describe three different methods for inserting foreign DNA into plasmids giving the advantages and disadvantages of each. 6+6
9. (a) How are genes inserted into bacteriophage λ vectors ? What advantages do λ vectors have over plasmids ?
- (b) Explain the important characteristics of cloning vectors. 6+6

UNIT—V

10. (a) Describe any two methods for preparation of a radioactive probe for Southern blotting.
- (b) Discuss the use of adaptors in cloning of a DNA fragment. 6+6
11. How does a cDNA library differ from a genomic library ? Describe the construction of a cDNA library.

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