B.Sc. Part–II Semester–III Examination

MICROBIOLOGY

(Molecular Biology and Genetic Engineering)

Time : Three Hours] [Maximum Marks : 80

Note.:— (1) All questions are compulsory.

(2) Draw well labelled diagram wherever necessary.

1. (A) Fill in the blanks :

(i) DNA replication is _____ in mode.

(ii) Mutations occurring due to mutagenic agents are called as _____ mutations.

(iii) The bacterial cells that are in a state of facilitating easy uptake of cell free foreign DNA fragments are called as _____ cells.

(iv) Genetically modified plant is known as _____ plant. 2

(B) Choose correct alternative :

(i) Unwinding of DNA strands during replication is done by enzyme called _____.

(a) DNA polymerase (b) Helicase

(c) DNA ligase (d) Topoisomerase.

(ii) Insertion and deletion mutations are caused by _____.

(a) 5BU (b) Acridine dyes

(c) Nitrous oxide (d) Hydroxylamine

(iii) Grifith experiment proved _____.

(a) Transduction (b) Transformation

(c) Conjugation (d) Transcription

(iv) pBR322 plasmid contains _____ genes.

(a) Ampicillin resistance genes

(b) Origin of replication

(c) None of the above

(d) Both Ampicillin resistance gene and origin of replication 2

(C) Answer in one sentence :

(i) Define conjugation.

(ii) What is Mutation ?

(iii) What is ECORI ?

(iv) What is PCR ? 4

2. (a) Describe any four characters of genetic code. 4

(b) What is translation ? Briefly describe initiation process of translation. 4

(c) Describe the concept of gene within gene. 4

OR

(d) Describe the role of DNA polymerase III, ligase, primase and topoisomerase for DNA replication. 4

(e) Describe the rolling circle model of DNA replication. 4

(f) Describe the light repair mechanism of DNA. 4

3. Describe in brief :

(a) Physical mutagens 4

(b) Nonsense mutations 4

(c) Genes of Lac operon 4

OR

(d) Base pair substitution mutation. 4

(e) 5 Bromouracil as mutagen 4

(f) Spontaneous Mutations. 4

4. Describe in detail the experiments for discovery of conjugation. 12

OR

Describe in detail the mechanism of transformation. How transformation differs from conjugation and transduction ? 12

5. (a) Give the outline of basic technique of genetic engineering. 4

(b) Describe the ideal characters of plasmid vectors. Give example. 4

(c) Describe the nomenclature of restriction endonucleases. Write the formation of sticky ends formed by the action of any restriction endonuclease. 4

OR

(d) Write the names of any four DNA modifying enzymes and their action. 4

(e) What are vectors ? Briefly explain the types of vectors with examples of each. 4

(f) Describe the role of alkaline phosphatase and polynucleotide kinase in DNA manipulations. 4

6. (a) Describe Agarose gel electrophoresis. 4

(b) Describe Southern Blotting technique with applications. 4

(c) Describe the use of antibiotic resistance gene for identification of transformed cell. 4

OR

(d) Explain the construction of gene library. 4

(e) What is PCR ? Write its method. 4

(f) Describe in brief colony hybridization. 4

7. Describe the construction of transgenic plants and their applications. 12

OR

What are the applications of genetic engineering in health care biotechnology ? Describe the production of recombinant insulin. 12