

(2 ½ Hours)

[75] Marks

NB.-(1) Attempt all questions.

(2) All questions carry equal marks.

Q.1. A) Answer any TWO of the following

[10]

1. Schematically explain the Meselson & Radding model of genetic recombination
2. Write a short note on conjugative & degrading plasmids in bacteria.
3. Draw a well labeled diagram of Tn3 & Tn10 transposons
4. Discuss advantages of *Sacharomyces cerevisiae* as a model organism in genetics

B) Answer any FIVE of the following

[5]

- i. Define- R plasmid
- ii. Define- Illegitimate recombination
- iii. Define- Replicative transposition
- iv. Give two examples of bacteria having plasmids for bacteriocin.
- v. Give two examples of prokaryotes used as a model organism in genetics
- vi. Give name of the enzyme required for transposition.
- vii. Define the term population genetic.
- viii. Give name of the method used for elimination plasmids from host cells.
- ix. Give the significance of Rec-A
- x. Define Intermolecular site specific recombination.

Q.2. A) Answer any TWO of the following

[10]

1. Differentiate between natural transformation in *Bacillus subtilis* & *Haemophilus influenza*
2. Schematically explain specialized transduction.
3. Write short note on Interrupted mating experiment.
4. A donor strain of bacteria with genes $a^+b^+c^+$ is infected with phages to map the donor chromosome with generalized transduction. The phage lysate from the bacterial cells is collected and used to infect a second strain of bacteria that are $a^-b^-c^-$. Bacteria with the a^+ gene are selected, and the percentage of cells with co-transduced b^+ and c^+ genes are recorded.

Donor	Recipient	Selected gene	Cells with co-transduced genes
$a^+b^+c^+$	$a^-b^-c^-$	a^+	35 b^+
		a^+	13 c^+

Is the b or c gene closer to gene a? Explain with reasoning

B) Answer any FIVE of the following

[5]

- i. Name the scientists who discovered conjugation.
- ii. Give the significance of Tra-S protein.
- iii. Define HFr cell.
- iv. Define Transducts..
- v. Define LFT lysate
- vi. Define prophage.
- vii. Give contribution of Hershey & Chase.
- viii. Give significance of ComX.
- ix. What is a natural transformation.?
- x. Give two examples of gram negative bacteria showing natural transformation.

TURN OVER

Q.3.A] Answer Any TWO of the following

[10]

1. Diagrammatically explain synthesis of telomeric DNA by telomerase.
2. How did Messelson and Stahl prove that DNA replication was semi conservative?
3. Write a short note on ter and tus proteins.
4. Describe replication of λ Phage.

B] Answer any FIVE of the following

[5]

- i. Name the short DNA fragments found during replication.
- ii. Give the function of SSB proteins,
- iii. Give the role of helicase protein.
- iv. Define Lagging strand.
- v. Name the protein present at primosome complex.
- vi. Define Template strand.
- vii. Define Replication fork.
- viii. Name the DNA clamp protein in prokaryotes.
- ix. Give the long form of ORC.
- x. Define Semi-conservative replication.

Q.4 A] Answer Any TWO of the following

[10]

1. Explain the basis of nucleotide excision repair.
2. How would you prove the spontaneous nature of mutation?
3. Explain briefly frame shift mutation and conditional lethal mutation.
4. How would you detect an auxotrophic mutant in a prototrophic population of cell?

B] Answer any FIVE of the following

[5]

- i. Define --Phenotype
- ii. Define --Non-Sense mutation.
- iii. Name the Mutator gene.
- iv. Give one example of Physical mutagen.
- v. Give the significance of hotspots.
- vi. Give the significance of Photolyase.
- vii. Name error prone repair mechanism.
- viii. Name the bacteria used in Ames test.
- ix. Define somatic mutation.
- x. Give example of base analogue.

Q.5. Answer Any Three of the following

[15]

1. Discuss characters of model organisms used in genetics.
2. Discuss Griffiths experiment.
3. Discuss gene mapping by transduction.
4. Differentiate between prokaryotic and eukaryotic DNA replication.
5. Explain dark repair mechanism of DNA in UV exposed bacterial cell.
6. Discuss in brief F' (prime), F^+ (plus) and F^- (minus) cells.