(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]

i. Differentiate between Initiation of DNA replication in Prokaryotes and Eukaryotes
ii. How would you prove that DNA replication is semiconservative?
iii. Draw a well labeled diagram of rolling circle mode of DNA replication
iv. Write a note on DNA gyrase.

B] **Answer any FIVE of the following** [5]

i. Define Catenanes
ii. Give the function of DNA polymerase I
iii. Give names of the scientists who proved that DNA replication is bidirectional
iv. Give the contribution of scientist Okazaki
v. Give the role of Tus protein
vi. Define- Ligase
vii. Explain- Conservative model of DNA replication
viii. Give name of one protein present at replisome complex
ix. Give names of 4 phases of eukaryotic cell cycle
x. Give one example of DNA polymerase present in eukaryotes

Q.2. A] Answer any TWO of the following [10]

i. Differentiate between transition and frame shift mutations.
ii. Diagrammatically illustrate dark repair mechanism.
iii. How would you prove that given chemical is carcinogenic?
iv. Write a note on replica plate technique

B] Answer any FIVE of the following [5]

i. Give one example of mutator genes
ii. Give one example of deaminating agent
iii. Define- Nonsense mutation
iv. Give significance of Hot spots
v. Give name of the enzyme involved in light repair
vi. MMS and EMS are examples of ---------- agents.
vii. Give name of protein involved in SOS repair
viii. Define- Auxotroph
ix. Explain the term conditional lethal mutation.
x. Define –Genotype

[PLEASE TURN OVER]

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Q.3.A] Answer any TWO of the following [10]

i. Differentiate between F' (F prime) and F⁻ (F minus) strains.

ii. Write a short note on the Holliday model of genetic recombination

iii. Schematically explain natural transformation in *Bacillus subtilis*

iv. Write an order of *a, b, c* and *d* genes from the following data

Markers	% Cotransductants
a-c	15
a-d	05
b-c	28
b-d	2.7
c-d	0

B] **Answer any FIVE of the following** [5]

i. Give one example of gram negative bacterium which demonstrates natural transformation

ii. Give the significance of U tube experiment.

iii. Name of the scientists who discovered conjugation

iv. Give the significance of interrupted mating experiment

v. Give role of Fduction

vi. What do you mean by HFT

vii. What is the role of helper phage?

viii. Define- Lysogeny

ix. Define -Merozygote

x. ---------- transduction is demonstrated by P1 phage

Q.4. A] Answer any TWO of the following [10]

i. Following is the lac operon genotype of a strain of *E coli* where *I*= lac I (represser gene), P= P lac (promoter), O= O lac (operator), *Z*= lac Z (β-galactosidase gene), *Y*= lac Y (lactose permease). Using + for production and – for non production for the enzymes complete the following table.

Genotype	Inducer absent		Inducer present	
$\frac{I^- P^+ O^+ Z^+ Y^-}{I^+ P^+ O^+ Z^- Y^+}$	β-galactosidase	permease	β-galactosidase	permease

ii. Discuss in brief on antibiotic resistance and virulence plasmids in bacteria.
iii. Draw a well labeled diagram of Tn3 and Tn10 transposons
iv. Write a short note on the positive regulation of lac operon

B] **Answer any FIVE of the following** [5]

i. Define -Stringent plasmids
ii. Give one example of integron
iii. Name one method for isolation of plasmids
iv. Give one example of bacteriocin
v. Define IS element
vi. Give the function of Acridine orange.
vii. Give long form of CCC
viii. Define Cryptic plasmids
ix. Name the region on F plasmid responsible for its mobilization
x. Define Catabolite repression

Q.5. Answer any THREE of the following [15]

i. Define phenotypic lag and explain different mechanisms to justify it.
ii. Diagrammatically explain mismatch repair mechanism.
iii. Describe in details F. Griffith's experiment to prove transformation
iv. Comment on- Linear DNA end replication problem in eukaryotes is solved by telomerase.
v. Write a short note on Hfr strain
vi. Discuss in brief regulation of trp operon through attenuation

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