3 Hours

Total Marks: 100

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat labeled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculator** is **allowed**.

Q.1 a. Give significance/role of: (Any six) **06**

1. Opines.
2. Reporter gene.
3. Right border sequences.
4. Vir G Protein.
5. Micro Ti.
6. Acetosyrigone.
7. Transgenic plants.
8. Polylinker site.
9. Gemini virus.

Q.1 b. Answer the following questions: (Any two) **14**

1. Describe the mechanism of transfer of T-DNA in plants.
2. "Particle gun method of gene delivery is an efficient method" - Justify.
3. Give an account of seed quality protein improvement.

Q.2 a. Explain the following: (Any six) **06**

1. Pluripotency.
2. Pharming.
3. Transgene.
4. Xeno mouse.
5. cre gene.
6. Male pronucleus.
7. Ganciclovir.
8. Green fluorescent protein.
9. Pseudopregnant female.

Q.2 b. Discuss the following questions: (Any two) **14**

1. Use of Cre- loxP recombination to regulate the expression of transgene.
2. Embryonic stem cell method of producing transgenic mice.
3. Cloning livestock by nuclear transfer.

Q.3 a. Do as Directed: (Any six) **06**

1. Define: shuttle vectors.
2. State the importance of phagemid vectors.
3. Name the enzyme used to form a phosphodiester bond between DNA molecules.
4. Give importance of 'chromosome walking' in a chromosomal library.
5. State the significance of 'western blotting'.
6. Name one 'high capacity vector'.
7. Name a blunt end forming restriction enzyme.
8. Name the enzyme: RNA dependent DNA polymerase.
9. Name one method of gene transfer in *E. coli*.

Q.3 b. Answer the following questions: (Any two) **14**

1. Elaborate on 'Southern blotting' for genomic library screening.
2. What are 'PET vectors'? Explain in detail.
3. Explain the use of pUC vectors in recombinant DNA technology.

Q.4 a. Attempt the following objective questions as directed: (Any six) **06**

1. Define `pyrosequencing'.
2. What is PAM ?
3. Explain the term `gene knockdown'.
4. State true or false: Hydrazine is used in automated DNA sequencing.
5. State true or false: CRISPR/Cas9 system induces single stranded break in DNA.
6. What are TALENs ?

7. Fill in the blank: Automated DNA sequencing uses different _____ labels for detection of order of nucleotides.
8. Fill in the blank: Chain termination method is based on incorporation of _____in DNA.
9. What is the role of tracrRNA?

Q.4 b. Answer the following questions (Any two) **14**

1. Compare and contrast between Maxam Gilbert's method and Sanger's method.
2. Discuss the mechanism of RNA interference and state its significance.
3. Illustrate the activity and advantages of Zinc finger nucleases.

Q.5 Write Short notes on the following: (Any four) **20**

a. Recent techniques for human genetic mapping.

b. Applications of CRISPR/Cas system.

c. Transgenic Fish.

d. Vectors for plant cells.

e. Lipofection.

f. Cosmid vectors.

_____