N.B. All questions are compulsory

Numbers to the right indicate marks

Draw neat labeled diagram wherever necessary

Duration: 3 hours **Total marks: 100**

Q.1 a Answer the following (ANY SIX) **06**

1) What are cointegrate vectors?
2) Pulses are rich in _____ amino acid.
3) Give any one advantage of lipofection as a method of physical transfer.
4) State the role of spermidine in direct uptake of DNA
5) Give an example of a geminivirus.
6) TRUE OR FALSE -The microprojectile bombardment method is also known as biolistic method.
7) _______ is a unique condensation product of an amino and a keto acid.
8) What is a selectable marker gene ?
9) What is the significance of border sequences in integration of the T DNA.

Q.1 b Answer the following (ANY TWO) **14**

1) Discuss in detail the process of infection of the plant by *Agrobacterium tumefaciens*
2) Write a short note on CaMV as a plant vector.
3) Discuss the approaches used for the improvement of seed protein quality.

Q.2 a Answer the following (ANY SIX) **06**

1) Define - Vasectomized mice.
2) Retrovirus derived vectors are _____________ defective.
3) Why blastocyst stage is chosen for transgenesis?
4) What is the function of Cre recombinase enzyme?
5) Recombination between loxP site of same orientation results in ___________ of DNA sequence.
6) Full form of iPS.
7) State one advantage of lentivruses.
8) Why is superovulation of mice performed?
9) TRUE OR FALSE- Dolly was cloned by transfer of nucleus from udder cells.

Q.2 b Answer the following (ANY TWO) **14**

1) Elaborate on ES method for transgenesis.
2) Explain in detail Cloning live stock by SCNT.
3) Write a note on transgenic fish with applications.

Q.3 a Answer the following (ANY SIX) **06**

1) Define: gene library.
2) Give significance of T3 promoter.
3) Name a cohesive end cutter.
4) In _______, RNA is extracted from the cell, undergoes gel electrophoresis and is transferred to a nylon membrane.
5) Give an example of reporter gene.
6) Name a single stranded coliphage.
7) State the molecular weight of pUC 19.
8) Fill in the blank: Enzyme ______ is used to seal a nick in double starnded DNA.
9) Define: isoschizomers.

Q.3 b Answer the following (ANY TWO) **14**

1) Elaborate on HRT and HART.

2) Explain the use of pBR322 as a cloning vector. Add a note on its advantages and drawbacks.

3) Explain the construction of a cDNA library.

Q.4 a Answer the following (ANY SIX) **06**

1) Guanine is methylated by ________ in Maxam and Gilbert sequencing. (NaCl/ DMS/ Acetic acid)

2) ________ cleaves sugar phosphate backbone of DNA next to modified bases. (PEG/ Piperidine/ DMSO)

3) ________ bp would be recognized by a pair of 3 zinc fingers. (6/ 12/ 18)

4) From which enzyme, DNA cleavage domain of ZFN is derived?

5) What is the optimum length of spacer sequence during dimerization of zinc finger?

6) What is gRNA in CRISPR-Cas9 gene editing tool?

7) State true or false: Maxam and Gilbert sequencing is also known as Chain termination sequencing.

8) Which method of DNA sequencing uses fluorescent labeling?

9) Give one application of ZFN.

Q.4 b Answer the following (ANY TWO) **14**

1) Give a detailed account on components of Sanger sequencing reaction.

2) Discuss in brief components and steps of pyrosequencing.

3) Write a note on TALENs.

Q.5 Answer the following (ANY FOUR) **20**

1) Write a short note on Electroporation.

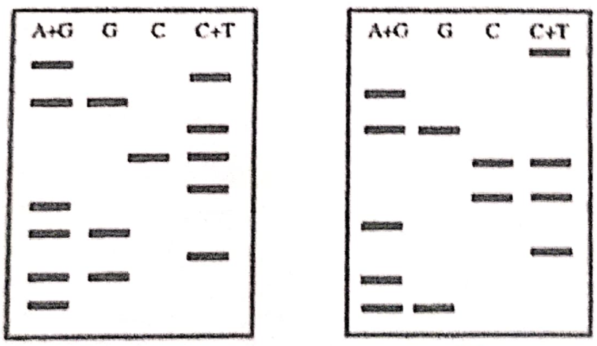
2) Elaborate on the upatke of DNA by using PEG mediated fusion technique.

3) Elaborate on positive negative selection.

4) Using suitable diagram, explain the use of linkers in cloning blunt ended molecules.

5) Diagrammatically represent spacer acquisition in CRISPR-Cas9 system.

6)



(a) (b)

Determine the sequence of original template DNA from the given autoradiogram [(a) and (b)] developed during Maxam and Gilbert sequencing.

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