

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. Select the correct alternative (Any six)**06**

1. _____ species of *Agrobacterium* cause crown gall disease.
 - a. *Agrobacterium rhizogenes*
 - b. *Agrobacterium tumefaciens*
 - c. *Agrobacterium vitis*
 - d. *Agrobacterium radiobacter*
2. Particle bombardment is otherwise called as _____.
 - a. Biostatic
 - b. Liposome mediated
 - c. Biolistic
 - d. Electroporation
3. _____ was the first plant developed using protoplast fusion
 - a. Rice
 - b. Tobacco
 - c. Millet
 - d. Sorghum
4. Which part of lipids forms the wall of transient aqueous pores after electroporation ?
 - a. Hydrophobic tails
 - b. Hydrophobic head
 - c. Hydrophilic tails
 - d. Hydrophilic heads
5. Identify an indirect gene transfer method from the following given method.
 - a. Electroporation
 - b. binary vector
 - c. Microinjection
 - d. Particle bombardment
6. FDA stands for _____.
 - a. Flavonoid diacetate
 - b. Ferrous diacetate
 - c. Fluorescein diacetate
 - d. Fluorine diacetate
7. Which of the following gene can be used for the improvement of seed protein quality of pulses:
 - a. EPSPS protein gene from petunia
 - b. zein proteins genes from maize
 - c. cry protein genes from BT
 - d. CHS protein gene from petunia
8. In a Binary vector system, a small intermediate vector system is used along with a selectable marker, it is called _____.
 - a. fusion plasmids
 - b. co-integrative plasmids
 - c. fusion plasmids
 - d. complex plasmids
9. Name the gas used for particle propulsion in biolistic transformation?
 - a. Neon gas
 - b. Argon gas
 - c. Hydrogen gas
 - d. Helium gas

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

1. Describe the need for seed quality protein improvement and the role of transgenic technology with suitable examples.
2. Explain different vectors used for plant cells.
3. Explain the electroporation and microprojectile bombardment mechanism of gene transfer.

Q.2 a. Select the correct alternative (Any six)**06**

1. During transfection in the embryonic stem cells method, DNA integrated at the non-target site are called as _____ sites.
 - a) correct
 - b) spurious
 - c) correct position
 - d) central
2. Transgenic _____ fish is used as biosensors of environmental pollutants.
 - a) medaka
 - b) sciodon
 - c) rohu
 - d) salmon

3. State the full form for YACs used as vectors for animal cells.
 - a) Yeast Artificial Chromosomes
 - b) Yeast artifact Chromosomes
 - c) Yeast Applied Chromosomes
 - d) Yeast Ancient Chromosomes
4. A regulatory element within the _____ is deleted to prevent the production of vector RNA from a promoter.
 - a) 3' LTR b) 5' LTR c) 5' RTR d) 3' RTR
5. One of the aims of targeted gene disruption (gene knockout) is to determine the development and physiological consequences of _____ a particular gene.
 - a) inactivation b) activation c) transcription d) translation
6. In the bacteriophage P1 genome, A lox P site consists of two 13-base-pair _____, that are separated from each other by an 8-bp spacer sequence.
 - a) side repeats b) inverted repeats c) simple repeats d) central repeats
7. In the lentiviral transfer method, PPT stand for?
 - a) Purine protein tract b) protein Purine tract
 - c) Polypurine tract sequence d) protein-protein tract
8. DNA is microinjected into _____ pronucleus of a fertilized egg.
 - a) female b) male c) zygote d) embryo
9. In cloning livestock by nuclear transfer method, induced somatic cells are fused to an enucleated oocyte with _____.
 - a) short-duration electric pulses
 - b) long-duration electric pulses
 - c) short-duration high electric pulses
 - d) long-duration high electric pulses

Q.2 b. Give an account on the following questions: (Any Two)

14

1. Retroviral method for production of transgenic mice.
2. Positive-negative selection system.
3. Transgenic sheep and its application.

Q.3 a. Select the correct alternative (Any six)

06

1. The media used to isolate host cells containing pUC vector is
 - a. NA + amp + IPTG b. NA + amp + X-Gal
 - c. NA + amp+ IPTG +X-Gal d. NA + amp + Y-Gal
2. What will happen when M 13 infects the host cell?
 - a. Host cell is lysed
 - b. Host cell continues growth at same rate
 - c. Host cell growth is arrested after a few generations
 - d. Host cell growth is slowed down and viral particles are released

3. A cloning vector containing regulatory sequences is called
a. Shuttle vector b. Expression vector c. Cosmid d. M13 phage
4. The T7 RNA pol gene is introduced in the
a. Host genome b. pET vector
c. Helper plasmid d. Any of them
5. In cell-free translation, the commonly used amino acid is
a. Alanine b. Tryptophan c. Methionine d. Isoleucine
6. The problem of repetitive DNA being a part of the probe and creating a problem while identifying the overlapping fragment is severe in
a. Chromosome walking b. Chromosome jumping
c. Both d. Neither
7. To increase the concentration of mRNAs in the cell extract, use a column lined with
a. oligo A b. oligo T c. oligo G d. oligo C
8. Identification of a specific protein in a complex mixture of proteins is done by
a. Eastern blotting b. Western blotting
c. Northern blotting d. Southern blotting
9. The enzyme used for in vitro synthesis of cDNA from mRNA
a. DNA pol I b. Klenow fragment
c. Reverse transcriptase d. Test

Q.3 b. Discuss the following: (Any Two)

14

1. Southern Blotting.
2. Method to screen a genomic library.
3. YAC as a cloning vector.

Q.4 a. Select the correct alternative (Any six)

06

1. ddNTPs are used in sequencing DNA because
a. ddNTPs are fluorescent
b. ddNTPs are incorporated very efficiently into DNA
c. ddNTPs cannot be incorporated into DNA by DNA polymerase
d. ddNTPs prevent further DNA synthesis once they are incorporated into the DNA
2. Pyrosequencing derives its name from the fact that
a. The bases are detected by pyrolysis
b. It uses the enzyme apyrase to detect the bases
c. It detects pyrophosphate released during base incorporation
d. It generates pyrograms as output
3. Double-stranded RNA is cleaved by a nuclease called as Dicer and small fragments are generated known as
a. Short interfering RNAs b. Long interfering RNAs
c. Short interspersed RNAs d. Long interspersed RNAs

4. Synthetic short strands of double-stranded DNA which have one blunt end and one staggered end are called
 - a. Linker
 - b. Tail
 - c. Adaptor
 - d. Probe
5. The role of apyrase enzyme in pyrosequencing is
 - a. To emit light
 - b. To detect nucleotide
 - c. To add primer
 - d. To destroy nucleotide
6. TALEs are proteins secreted by
 - a. Plants
 - b. Bacteria
 - c. Animals
 - d. Virus
7. An enzyme that creates a double-strand break at the target site for genome editing is
 - a. ZFNs
 - b. TALENs
 - c. CRISPR Cas9
 - d. All three
8. The PAM sequence serves as
 - a. Binding signal for Cas9
 - b. Promoter sequence
 - c. TALEN binding site
 - d. ZFNs binding site
9. DNA sequencing method developed by Sanger and Colleagues in 1977 is
 - a. Chemical sequencing method
 - b. Premature chain termination method
 - c. Pyrosequencing
 - d. Shotgun sequencing

Q.4 b. Give an account of the following questions: (Any Two)

14

1. Pyrosequencing as a method for DNA sequencing.
2. CRISPR- Cas for gene editing.
3. How does HGP help in the diagnosis and treatment of genetic diseases?

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

20

- a. Liposome-mediated gene transfer.
 - b. Vir genes.
 - c. Transgenic Alzheimer disease model.
 - d. Radioactive labeling of DNA.
 - e. Expression vector.
 - f. Compare Sanger's enzymatic method and Maxam-Gilbert chemical method of sequencing.
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