

**M.Sc. BIOTECHNOLOGY
THIRD SEMESTER
GENETIC ENGINEERING
MBT-301**

(Use separate answer scripts for Objective & Descriptive)

Duration : 3 hrs.

Full Marks : 70

(PART-A : Objective)

Time : 20 min.

Marks : 20

Choose the correct answer from the following:

1x20=20

1. The 300Kb DNA can be inserted into.....
 - a. Plasmid
 - b. YAC
 - c. Cosmid
 - d. BAC
2. Sticky ends are preferable because.....
 - a. Ligase is required in low concentration
 - b. Ligase is not required at all
 - c. Ligase is required in high concentration
 - d. None of the above
3. Restriction modification system requires Methylases and.....
 - a. Polymerases
 - b. Restriction enzymes
 - c. Kinases
 - d. Phosphatases
4. RNase H digests.....
 - a. RNA-DNA hybrid
 - b. ssDNA and RNA
 - c. dsDNA
 - d. ssDNA and ds DNA
5. 3' OH is connected to 5' P group of DNA by.....
 - a. Ligase
 - b. Type I nucleases
 - c. Isoschizomers
 - d. Type II nucleases
6. Usuallysequence is added to the primer used against 3' region of RNA.
 - a. 5'CCCCCCCC3'
 - b. 5'GGGGGGGG3'
 - c. 5'AAAAAAAAA3'
 - d. 5'TTTTTTTTTT3'
7. The function of Alkaline phosphatases is to.....
 - a. Add phosphate
 - b. Remove P
 - c. Synthesize P
 - d. None of the above
8. Molecular tools are.....
 - a. DNA
 - b. RE and ligases
 - c. Vector
 - d. Both b and c
9. Shuttle vector's example is.....
 - a. YAC
 - b. BAC
 - c. Lambda
 - d. Cosmid
10. Reverse transcriptase is not used in.....
 - a. cDNA library construction
 - b. Retroviruses
 - c. Genomic DNA library preparation
 - d. All are correct

11. Dideoxy nucleotides are required in:
- In place of normal nucleotides at high concentration.
 - Chain termination method.
 - Chemical method.
 - All are correct.
12. The marker used in DNA finger printing is:
- Mini satellites
 - SNP
 - Micro satellites
 - ISSR
13. The most common vector for plants are:
- SV 40 Vectors and Bovine Papilloma virus vectors.
 - Lambda phage and M13 phage vectors.
 - Cauliflower mosaic virus and Gemini virus vectors.
 - T4 phage vectors.
14. Solid matrix mostly used in Southern is:
- Glucose membrane
 - Nitrocellulose membrane
 - Nylon membrane
 - All can be used
15. Which portion of Ti plasmids is transferred to plants to cause crown gall disease?
- T-DNA region
 - Ori
 - Vir region
 - All of the above
16. *Pfu* and *Vent* polymerase are more efficient than Taq polymerase because:
- Of more efficient polymerase activity
 - Of proof reading activity
 - Both a and b
 - None of these
17. Which of the following would be eliminated by Hot Start PCR?
- Aerosol contamination from the barrel of pipetors.
 - Addition of nucleotide to the terminal end of PCR products.
 - Infidelity of DNA copying by Taq DNA polymerase.
 - Formation of primer-dimers.
18. Which of the following bio-molecule has self repair mechanism?
- DNA, RNA and protein
 - DNA and RNA
 - DNA and protein
 - DNA only
19. Which of the following methods for introducing DNA into cells is used only for plants?
- A gene 'gun
 - Microinjection
 - Electroporation
 - Transformation of competent cells
20. The DNA chain acting as template for RNA synthesis has the following order of bases, AGCTACGA. What will be the order of bases in mRNA?
- TCGATGCT
 - TCGAUGCT
 - UCGUAGCU
 - UCGAAGCU

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(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

- How will you transform plants using *Ti* plasmids? Discuss any two physical mediated methods used for transferring gene of interest into the cell. 5+5=10
- Explain restriction endonucleases with suitable restriction site. Explain function of ligase with suitable diagram. 5+5=10
- Discuss the restriction mapping mechanism in brief. Write basic differences between BAC and YAC. 4+6=10
- Explain homopolymer tailing with its significance. Explain sticky end is preferable in genetic engineering. 6+4=10
- Explain plasmid with suitable structure. Explain the characteristics of a good vector. 6+4=10
- Using Sanger sequencing method how will you determine the sequence of the DNA template: ATCGATCGATCTTAGCCATA? Explain with the help of suitable diagram. 10
- What is the function of $MgCl_2$ and dNTPs in polymerase chain reaction (PCR)? Calculate the annealing temperature of the primer: GACTCCTATAGTCTACAAATGCC. Briefly explain Hot start PCR? 2+3+5=10
- Write short notes on: 2x5=10
 - Blotting technique to identify the product of a gene of interest
 - PCR based molecular marker

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