



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Sc (H), Genetics, MolBio, MicroBio, BT/SEM-4/MOG-401/2011**

**2011**

**MOLECULAR GENETICS**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

**GROUP – A**

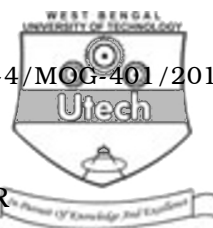
**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

- i) Cloning requires all the following *except*
  - a) restriction enzyme      b) DNA ligase
  - c) methylase                d) vector.
- ii) EcoRI is a what type of restriction enzyme ?
  - a) Type I                      b) Type II
  - c) Type III                    d) None of these.
- iii) 'ARS' stands for
  - a) Artificially Replicating Sequence
  - b) Autonomously Replicating Sequence
  - c) Automatically Replicating Sequence
  - d) None of these.



- iv) Which one is employed in the DNA hybridization assay ?
- a) Etbr
  - b) Enzyme
  - c) Chemiluminicent moiety
  - d) None of these.
- v) Which of the following method is most useful for enzymatic amplification of specific segment of DNA ?
- a) Nucleotide sequencing
  - b) DNA hybridization
  - c) PCR
  - d) None of these.
- vi) Gene expression can be analyzed by
- a) Southern Blot
  - b) Restriction Digestion
  - c) Northern Blot
  - d) None of these.
- vii) In Southern Blotting experiment, the binding of transferred DNA to the Nitrocellulose Membrane is ..... type.
- a) Ionic
  - b) Covalent
  - c) Hydrophobic
  - d) van der Waal.
- viii) DNA hybridization is a technique, which relies on the following properties of DNA, *except*
- a) double strandedness
  - b) sequence specificity
  - c) major and minor grooves
  - d) denaturation-renaturation properties.
- ix)  $\beta$ -lactum ring is present in
- a) Tetracycline
  - b) Ampicillin
  - c) Kanamycin
  - d) Streptomycin.



- x) For RNA detection which PCR is best ?
- a) Nested PCR                                  b) RT-PCR
- c) ARMS-PCR                                  d) MS-PCR.
- xi) In Southern Blotting experiment, the binding of transferred DNA to the Nylon membrane is ..... type.
- a) Ionic    b) Covalent
- c) Hydrophobic                                  d) van der Waal.
- xii) In Western Blot the protein samples are run on
- a) Agarose gel
- b) Polyacrylamide gel
- c) Formaldehyde-agarose gel
- d) None of these.

**GROUP – B**

**( Short Answer Type Questions )**

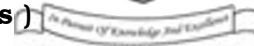
Answer any *three* of the following.                  3 × 5 = 15

2. Why are Type II restriction enzymes considered to be the most useful in molecular biology ? How is it different from Type I ?    3 + 2
3. Write a short note on c-DNA library.
4. What do you mean by restriction modification system in bacteria ? Explain.
5. Write the basic differences between Capillary transfer and Electro-transfer in Southern Blot.
6. Define cloning vector. What should be the properties of a good vector ?    1 + 4



**GROUP – C**

**( Long Answer Type Questions )**



Answer any *three* of the following.  $3 \times 15 = 45$

7. What components involved in cloning ? Describe the cell based DNA cloning process with suitable diagram. What are the usefulness of M13 vector ? What are the characteristics of YAC and BAC vector ?  $4 + 5 + 2 + 4$
8. Describe the steps ( preferably with diagram ) involved in PCR mentioning the appropriate temperature. Write the advantages of PCR over cloning.  $10 + 5$
9. What is Southern Blotting ? Who invented it ? Write the basic steps involved in Southern Blotting ? What can you use as a probe in Southern Blotting ?  $2 + 1 + 10 + 2$
10. a) What are the necessities of probe labelling in all blotting experiments ?
- b) What are the different types of labelling techniques for the probe ?
- c) Explain the process for developing probes to identify the pathogens.
- d) Give an example of non-radio labelling of probe.  $3 + 4 + 6 + 2$
11. Write short notes on any *three* of the following :  $3 \times 5$
- a) In vitro DNA cloning
- b) Nick translation
- c) Directional cloning
- d) Plaque hybridization.