

Name :

Roll No. :

Invigilator's Signature :

CS/B.Sc.(H)/BT/GEN/MICRO-BIO/MOL-BIO/SEM-4/MOG-401/2013

2013

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

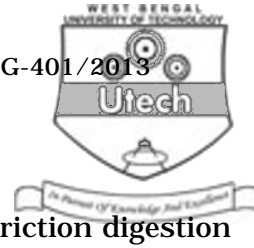
i) Which of the following methods is most useful for enzymatic amplification of specific segment of DNA ?

a) Nucleotide sequencing

b) DNA hybridization

c) PCR

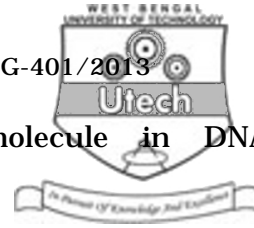
d) None of these.



- ii) Gene expression is analyzed by
- a) Southern blot
 - b) Restriction digestion
 - c) Northern blot
 - d) None of these.
- iii) In southern blotting experiment, the binding of transferred DNA to the nylon membrane is type.
- a) ionic
 - b) covalent
 - c) hydrophobic
 - d) van der Waals.
- iv) 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.
- v) For RNA detection which PCR is best ?
- a) Nested PCR
 - b) RT-PCR
 - c) ARMS-PCR
 - d) MS-PCR.



- vi) In Western blot the protein samples are run on
- a) Agarose gel
 - b) polyacrylamide gel
 - c) formaldehyde-agarose gel
 - d) none of these.
- vii) The stringency of a hybridization reaction depends on all of the following, *except*
- a) NaCl concentration
 - b) type of reporter molecule
 - c) nucleotide sequence of probe
 - d) pH.
- viii) Ligase joins two DNA molecules together by forming a covalent bond between
- a) two PO_4
 - b) two OH
 - c) one PO_4 and one OH
 - d) Complementary nucleotides on opposite strands.
- ix) β -lactum ring is present in
- a) Tetracycline
 - b) Ampicillin
 - c) Kanamycin
 - d) Streptomycin.



- x) Principal function of reporter molecule in DNA hybridization assay
- a) enhance the stringency of hybridization reaction
 - b) aid in base pairing
 - c) aid in the detection of probe target hybridization
 - d) bind the target DNA to the solid support.
- xi) More stringent washing condition is selected when
- a) Probe has lower affinity with the DNA
 - b) Probe has higher affinity with the DNA
 - c) Probe is radio-labelled
 - d) Probe is non-radio-labelled/enzyme labelled.
- xii) Microsatellites are
- a) frequently found in bacterial genomes
 - b) always smaller than 50 bp
 - c) used as DNA marker
 - d) movable DNA elements.



GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Write a short note on cDNA library.
3. Write the basic differences between capillary transfer and electro-transfer in southern blot.
4. Define cloning vector. What should be the properties of a good vector ? 2 + 3
5. Why Type-II restriction enzymes are considered to be the most useful in molecular biology ? How it is different from Type-I ? 3 + 2
6. What is MCS in a vector ? Why alkaline phosphatase treatment is needed in cloning ? What is linker ? How it differs from adapters ? 1 + 2 + 1 + 1
7. What is Directional Cloning ? When you use this ? Where it is different from conventional cloning ? 2 + 1 + 2
8. What do you mean by Restriction Modification System in bacteria ? Explain.



GROUP - C

(Long Answer Type Questions)

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

9. What is the basic structure of plasmid vector ? Explain the regulation of expression vector. What are steps of gene cloning ? What are the characteristics of YAC and BAC ?

$3 + 5 + 3 + 4$

10. Write short notes on any *three* of the following : 3×5

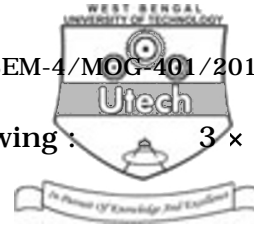
- a) Sanger and Coulson method for DNA sequencing
- b) Protein Blotting
- c) Microarray
- d) Inverse PCR.

11. What is Agarose ? PCR amplification is based on which theory ? Briefly discuss the steps of PCR with suitable diagram. Write down the applications of PCR. Briefly explain the efficiency of PCR.

$2 + 1 + 4 + 4 + 4$

12. What is a probe ? How they are classified ? What is Dot Blot technique ? Briefly describe the technique of RFLP and Asymmetric PCR.

$2 + 3 + 4 + 6$



13. Write short notes on any *three* of the following : 3 × 5

- a) RAPD
- b) M13 vector
- c) Blue-White screening
- d) T-DNA transfer technique
- e) Southern Blotting.

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