

2012

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 :

$10 \times 1 = 10$

i) Type II restriction enzymes have which of the following characteristics ?

- a) Repetitive sequence b) Conserved sequence
- c) Palindromic sequence d) None of these.

ii) Which of the following parameters is taken in consideration during primer designing ?

- a) Length of DNA b) GC content
- c) Both (a) & (b) d) None of these.

iii) Which one requires NAD⁺ ?

- a) T4 DNA ligase b) *E.coli* DNA ligase
- c) Both of these d) None of these.

iv) What does PUC stand for ?

- a) Produced by the University of California
- b) Produced by the University of Cambridge
- c) Produced by the University of Colombia
- d) Produced by the University of Cornell.

v) Cloning requires all the following, *except*

- a) Restriction enzyme b) DNA ligase
c) Methylase d) Vector.
- vi) BamHI is a type of restriction enzyme.
a) Type I b) Type II
c) Type III 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 Waals.
- viii) If a probe length is less than 200 b.p. is most useful.
a) Nylon membrane
b) Nitrocellulose membrane
c) Whatman filter paper
d) None of these.
- ix) Denaturants such as formamide cause ds DNA to melt by
a) decreasing the repulsion between phosphates
b) increasing the hydrophobic interactions between bases
c) increasing the repulsion between the phosphates
d) decreasing the hydrophobic interactions between bases.
- x) The technique of RT-PCR is best suitable for detection of
a) Allele b) Pathogen
c) Amplicon d) RNA.

- xi) Which one is a reporter gene ?
- a) Lac Z b) Luciferase
 - c) CAT d) All of these.
- xii) Which one is employed in the DNA hybridization assay ?
- a) Etbr
 - b) Enzyme
 - c) Chemiluminiscent moiety
 - d) None of these.

GROUP – B

(Short Answer Type Questions)

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

2. Describe Dot blot hybridization.
3. What is linker and its application ? How is it different from Adaptors ?
4. Write short notes on the following :
 - a) M13 Phage vector.
 - b) Micro-array
 - c) Nested PCR
 - d) RAPD.
5. Describe multiplex PCR.
6. What is SDS PAGE electrophoresis ? What is the significance of using SDS in this technique ?

GROUP – C

(Long Answer Type Questions)

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

7. What is Cloning ? Write down the steps of gene cloning. Why Alkaline Phosphate treatment is needed in cloning ? Write a

short note on Nick Translation. $2 + 5 + 3 + 5$

8. What are the properties of good vector ? What is Blue-White screening ? What is Agrobacterium based plasmid vector ?

Discuss the mechanism of T-DNA transfer. $4 + 4 + 3 + 4$

9. Describe Colony Hybridization techniques. What is Protein blotting Technique ? Briefly describe the technique. What kind of probe is used in Southern blotting ? $5 + 2 + 6 + 2$

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

- a) Maxam and Gilber's chemical degradation method.
- b) Gel Electrophoresis.
- c) Sanger and Coulson method of DNA sequencing
- d) Site Directed mutagenesis.

11. Write short notes on any *three* of the following : $3 \times 5 = 15$

- a) Nested PCR
- b) Insertional inactivation
- c) Red white screening
- d) Site directed mutagenesis.

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