Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(BT)/SEM-1/MBT-115A/2012-13

2012

GENOMICS & PROTEOMICS

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. Answer the following questions : $10 \times 1 = 10$

A) Choose the correct alternatives for the following :

i) Two species *A* and *B* were hybridized to form species *C*. Which of the following techniques can be used to confirm that the resultant species *C* is a hybrid ?

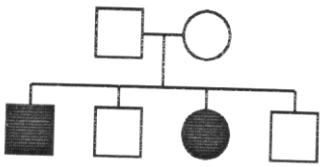
a) Morphological analysis

b) Molecular marker analysis

c) DNA hybridation

d) Cluster analysis.

ii) The following pedigree represents the inheritance of a rate disorder :



Based on the above pedigree what is the most likely mode of inheritance ?

a) Autosomal recessive b) *X*-linked recessive

c) *X*-linked dominant d) *Y*-linked dominant.

iii) Which of the following is not a co-dominant marker ?

a) RAPD b) RFLP

c) SNP d) None of these.

iv) The bonds that can fragment along the amino acid backbone is

a) NH–CH, CH–CO, CO–CH

b) CH–CO, CO–NH, NH–CR

c) NH–CH, CH–CO, CO–NH

d) none of these.

v) CpG islands and codon bias are tools used in eukaryotic genomics to

a) identify open reading frames

b) differentiate between eukaryotic and prokaryotic DNA sequences

c) look for DNA-binding domains

d) none of these.

vi) In which form of DNA, the number of base pairs per helical is 10·5 ?

a) *A* b) *B*

c) *X* d) *Z*.

vii) Human genome contains about

a) 6 billion genes b) 10000 nucleotides

c) 6 billion nucleotides d) none of these.

viii) Two fruitflies with mutant eye colour were crossed. All progenies obtained from this cross had wild type eye colour as

a) the mutant are allelic

b) one mutant is dominant over the other

c) the mutants are co-dominant

d) the mutants are in two different genes.

B) Answer the following questions in brief :

ix) What is the full form of MALDI-TOF ?

x) Fill in the blank :

SAGE stands for ..... .

GROUP – B

(Short Answer Type Questions)

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

2. Write down the principle of 2D Electrophoresis. Write the advantages of immobilized pH gradient (IPG) over synthetic carriers ampholics (SCA).

3. Briefly explain gene location by sequence inspection.

4. Briefly explain with the help of a flow-chart the PCR-directed protein *in situ* arrays.

5. Write on Cot value and thermal melting point of DNA and their application in genome study.

6. Write short notes on any *two* of the following : $2 \times 2\frac{1}{2}$

a) Gene annotation

b) Pharmacogenetics

c) ESTs.

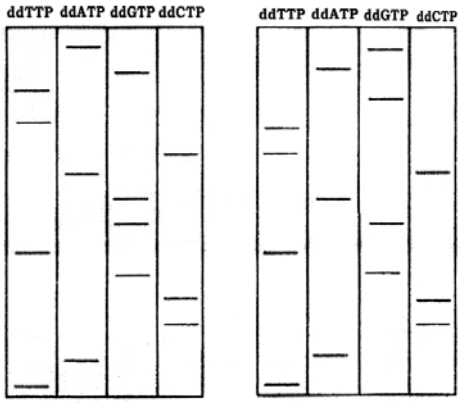
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Briefly write the structural organization of human genome.

b) Figures *A* and *B* respectively represent the dideoxy sequencing gels obtained for partial sequences from 5'-ends of a bacterial gene and its mutant (with a point mutation). What type of mutation has occurred in the sequenced gene ? Illustrate.



A : Wild Type B : Mutant

c) In tomato the mutant genes *o* (oblate = flattened fruit), *p* (peach = hairy fruit), and *s* (compound inflorescence = many flowers in a cluster) were found to be in chromosome 2. From the following data determine :

i) Assign the three gene sequence

ii) Genotypes of the parents

iii) Distance between the genes

iv) Coefficient of coincidence

v) Percentage interference.

Phenotypes of test cross	Number of progenies
+++	70
++*s*	340
+*p*+	2
+*ps*	90
o++	120
o+*s*	5
op+	310
ops	65

5 + 5 + 5

8. What are the approaches for protein identification ? Discuss the working principle of Triple Quadrupole. Describe the use of proteomics technology for identifying a novel protein from the early onset of viral flue.

9. a) Illustrate schematically the construction of Yeast two hybrid system.

   b) Explain briefly the use of comparative genomics in gene annotation.

   c) What are the advantages of LC-MS and SELDI techniques in protein identification ? 5 + 5 + 5

10. a) Design an experiment to study the affect of toxicants on *E.coli* through proteomics approach.

    b) Explain the use of cytochromes in microarray technologies, cite one hypothetical example. 10 + 5

11. a) Explain structural proteomics.

b) Develop proteomic signatures of gastrointestinal stromal tumours in human.

c) Differential proteomics of human seminal plasma : *A* potential target for searching male infertility maker proteins. Design an experiment to justify it. 3 + 6 + 6

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