



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech-PHMB/SEM-2/PHMB-203/2012**

**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**

Answer Question No. 1 and any *three* of the rest.

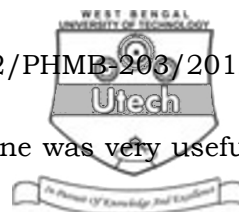
1. Choose the correct answers for *five* of the following :

$$5 \times 1 = 5$$

- a) Microarray can commonly be used to detect
- i) DNA Copy number variations and Microsatellite variations
  - ii) Single nucleotide variation (SNP/mutation) and quantitative expression of genes
  - iii) Relative expression of genes and copy number variation.
  - iv) Translocation of genes and expression of genes.



- b) Polymerase chain reaction can be used to detect
  - i) Minisatellite markers and Single base substitutions only
  - ii) Translocation of a gene and quantitative change in gene expression only
  - iii) Microsatellite markers and Single base substitutions only
  - iv) All of these.
- c) DNA-Transcription factor interaction can be studied by
  - i) RNA sequencing, PCR and DNA sequencing
  - ii) Protein sequencing and DNA sequencing
  - iii) DNA sequencing and PCR
  - iv) PCR only.
- d) A set of gene has been observed to express in the same tissue at same level in many experiments using micro array. The most possible explanation of this observation is
  - i) the genes may be regulated by same transcription factors
  - ii) they together may carry out the same biological functions
  - iii) they are regulated by same regulators (Transcription factors/micro RNA) and perform together same functions
  - iv) the genes are conserved through evolution.



- e) Among the following vectors, which one was very useful for human genome sequencing
- i) Plasmid
  - ii) Cosmid
  - iii) Mammalian artificial chromosome
  - iv) Yeast artificial chromosome and bacterial artificial chromosome.
2. What are the different markers in human genome commonly used to identify the gene causing the Mendelian genetic disease ? Describe in brief the principles of the methods for identifying the gene causing the Mendelian Genetic disease.
- 3 + 7
3. Describe the basic principles of DNA sequencing. What is shot gun sequencing ? What are the differences between the methods of sequencing the genome using “clone by clone” sequencing and shot gun sequencing ?
- 2 + 3 + 5
4. Describe the basic principles of making the microarray. What are the information we get by microarray analysis for gene expression ?
- 6 + 4
5. Write short notes on any *two* of the following :
- 2 × 5
- a) Functional Cloning of the gene that causes Mendelian Genetic disease
  - b) Uses of Expressed Sequence Tag (EST)
  - c) Uses of SNPs.



**GROUP - B**

6. Answer the following :  $5 \times 1 = 5$
- a) What is the first dimension called in 2D gel electrophoresis ?
  - b) Name one database of 2D gel electrophoresis.
  - c) What is the advanced mass spectrometer called ?
  - d) What is last step in a microarray technology ?
  - e) Name a common matrix used in MALDI TOF.
7. Answer any *two* of the following :  $2 \times 5 = 10$
- a) Explain in brief the first dimension and second dimension analysis of 2D gel electrophoresis. Also mention its advantages over one dimensional electrophoresis.  $4 + 1$
  - b) What is the need of microarrays ? Is protein array design easier than DNA array ? Justify.  $3 + 2$
  - c) Explain excision and in-gel digestion in gel electrophoresis.  $5$
8. Answer any *two* of the following :  $2 \times 10 = 20$
- a) How is a reflectron TOF-mass spectrometer improved than linear TOF-mass spectrometer ? Explain with a neat diagram.  $7 + 3$
  - b) Describe the various steps involved in comparing gene expression in a diseased and normal tissue of the same type using microarray technology.  $10$
  - c) Mention various classes of capture molecules for protein arrays and discuss their importance with example.  $5 + 5$
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