



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(BT-OLD)/SEM-4/BT-403/2012**

**2012**

**MOLECULAR BIOLOGY & r-DNA TECHNOLOGY**

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) Enzyme which is ribonucleic acid in nature is called

- |             |           |
|-------------|-----------|
| a) RNA      | b) DNA    |
| c) Ribozyme | d) RNase. |

ii) The fluorescent dye used to detect DNA band by UV  
Tranilluminator is

- |                     |                 |
|---------------------|-----------------|
| a) Ethidium bromide | b) SyBR green   |
| c) Methylene Blue   | d) Fluorescein. |



iii) Which of the following enzyme is not used in cloning?

- a) Peptidyl transferase      b) DNA polymerase
- c) DNA ligase                      d) Reverse transcriptase.

iv) tRNAs are synthesized by

- a) RNA polymerase I      b) RNA polymerase II
- c) RNA polymerase III      d) RNA polymerase IV.

v) The recognition sequence of  $\sigma$  factor of RNA polymerase is called

- a) Pribnow Box                      b) TATA box
- c) CAAT Box                      d) Enhancer sequence.

vi) Kozak sequence is present in

- a) mRNA                              b) snRNA
- c) rRNA                              d) tRNA.

vii) Sticky end is generated by

- a) Eco RI                              b) Pvu II
- c) Sma I                              d) Hae III.



viii) Type II restriction endonuclease was discovered by

- a) Hamilton Smith                      b) Paul Berge
- c) Stanley cohen                      d) Herbert Boyer.

ix) HRE is a

- a) Piece of DNA
- b) Piece of *mRNA*
- c) Protein
- d) Piece of *rRNA*.

x) Enzyme system responsible for post transcriptional modification of *hnRNA* is

- a) Ribosome                      b) Ribozyme
- c) Splisosome                      d) Mesosome.

xi) Lac operon genes of *E.coli* will be activated when the bacteria are grown in

- a) high glucose, low lactose
- b) high lactose, low glucose
- c) low glucose, low lactose
- d) all of these.



xii) Feedback inhibition is seen in

- a) Lac operon
- b) Ara operon
- c) Trp operon
- d) Gal operon.

xiii) Difference between thyroxine receptor and insulin receptor is

- a) insulin receptor is membrane bound, but thyroxine receptor is cytosolic
- b) thyroxine receptor activates protein kinase enzymes but insulin receptor does not
- c) after ligand binding, insulin receptor interacts with DNA directly, but thyroxine receptor does not
- d) thyroxine receptor acts as silencer but insulin receptor acts as enhancer or transcription.

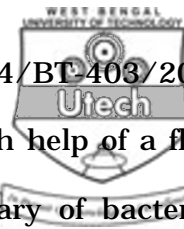
#### **GROUP – B**

##### **( Short Answer Type Questions )**

Each answer should not exceed 50 words.

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

- 2. What do you mean by degeneracy of codon ? How degeneracy of codon help the route of evolution ?  $2 + 3$
- 3. What do you mean by uncharged and charged *tRNA* ? Mention the reactions of attachment of amino acid with *tRNA*.  $2 + 3$



4. What is a gene and cDNA library ? State with help of a flow chart, the procedure of making a gene library of bacterial genome. 2 + 3
5. State briefly the steps of post transcriptional modification of eukaryotic mRNA.
6. What is a lariat ? State how it formed and its significance in RNA editing. 1 + 4
7. What is a shuttle vector ? Give an example of this. Why is it preferable to produce a human recombinant protein in yeast than in bacteria ? Name the means of introducing a foreign gene in a higher eukaryotic organism. 1 + 1 + 2 + 1

**GROUP - C**

**( Long Answer Type Questions )**

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

8. Why is it necessary to sequence the human genome ? What is the latest estimate of the human genes ? What are the goals of HGP ? What is short gun sequencing ? Describe the method with a suitable diagram. 2 + 1 + 4 + 2 + 6
9. State the differences among the different blotting techniques. State the working principals of Sanger method of DNA sequencing technique. 9 + 6



10. State briefly how polymerase chain reaction helps in site directed mutagenesis. A DNA sample of 100 molecular was amplified in a PCR instrument of 1 hour. Considering a cycle period of 5 min in average, how many DNA molecular would you expect ?

1 + 3

What are the different types of gene therapy known to you ? State with suitable diagram, the procedure of one type of gene therapy.

1 + 3

What is antisense RNA technology ? How many types of antisense RNA are there ? What is gene silencing ? What is the significance of antisense technology in gene silencing ?

1 + 2 + 1 + 3

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

- a) Application of rDNA technology
- b) Positive control of lac operon
- c) Transcription factors
- d) *E coli* RNA polymerase.

12. State with the help of a neat diagram the position and inter relationship of enhancer, silencer, activator and repressor. What is the importance of acetylation and methylation of histones in eukaryotic gene regulation.

5 + 2

What are the differences between prokaryotic and eukaryotic transcription ? Briefly describe the initiation of prokaryotic translation.

3 + 5



13. How can you prove that synthesis of an RNA chain proceed from 5' to 3' direction ? What is abortive transcription ? Discuss the reason behind this. Discuss the importance of  $\sigma$  factor in the initiation of transcription. 4 + 2 + 2 + 3

What is DNA fingerprinting ? What is its application ? 2 + 2

14. What is RAPD ? What is its application ? 3 + 2

State two advantages & two disadvantages of the following vectors : 5 × 2

- a) PBB32
- b) YAC
- c) Cosmid
- d) Phage
- e) Ti plasmid.

