*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) *t*RNAs 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) *m*RNA b) *sn*RNA

c) *r*RNA d) *t*RNA.

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 *m*RNA

c) Protein

d) Piece of *r*RNA.

x) Enzyme system responsible for post transcriptional modification of *hn*RNA 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 thyroxin receptor and insulin receptor is

a) insulin receptor is membrane bond, but thyroxin receptor is cytosolic

b) thyroxin receptor activates protein kinase enzymes but insulin receptor does not

c) after ligand binding, insulin receptor interacts with DNA directly, but thyroxin receptor does not

d) thyroxin receptor acts as silencer but insulin receptor acts as enhancer or transcription.

## GROUP – B

### ( Short Answer Type Questions )

Each anwer should not exceed 50 words.

Answer any *three* of the following. 3 × 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 charge *t*RNA ? Mention the reactions of attachment of amino acid with *t*RNA. 2 + 3

4. What is a gene and *c*DNA 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 transcriptonal modification of eukaryotic *m*RNA.

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 followiing : 3 × 5

    a) Application of *r*DNA 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.