24/12/24

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1109 **I**

Unique Paper Code : 2492013503

Name of the Paper : Gene Expression and Regulation

Name of the Course : **B.Sc. (Hons.) Biochemistry**

Semester : V

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **6** questions.
3. Attempt any **4** questions.
4. **All** questions carry equal marks. Question No. **1** is compulsory.

1. (a) Briefly explain the function of following proteins/ terms :

   (i) Abortive transcription

   (ii) CAP

P.T.O.

(iii) RNA Pol III

(iv) EF-Tu

(v) RISC

(vi) Polycistronic mRNA

(vii) Enhancers

(viii) Insulators

(ix) Mediator complex

(x) Release factors

(b) Briefly explain the following statements :

(i) RNA polymerase core enzyme is catalytically active but non-specific.

(ii) Transcriptional regulation in eukaryotes is primarily positive. (10,5)

2. Differentiate between the following (**any 5**) :

(a) Group I and Group II introns

(b) Rho dependent and independent transcription termination.

(c) RNA Pol I and RNA Pol II

(d) Transcription and Replication

(e) siRNA and miRNA

(f) Lac Repressor and Trp Repressor (15)

3. (a) What are the different consensus sequences in the promoter region of prokaryotes and eukaryotes? Explain with the help of a diagram.

(b) You are provided with two proteins (X and Y), one of which can potentially bind onto the promoter sequence of gene Z and help RNA polymerase in regulating gene expression. Describe a technique with which you can confirm which one out of X and Y does bind to the promoter sequence.

(c) Briefly explain how mRNA ends are processed with the help of a diagram. (5,4,6)

4. (a) Diagrammatically explain how one eukaryotic gene can give rise to two functional proteins.

(b) Explain the phenomena of attenuation with the example of the Trp operon in bacteria.

(c) Discuss the importance of GTP in the translation process. Explain how tRNA synthetases play the most crucial roles in determining the fidelity of translation. (4,6,5)

5. (a) Discuss the salient features of the Genetic code.

(b) Explain four mechanisms by which eukaryotic repressors repress transcription.

(c) Write the mechanism of action of the following :

(i) Rifampicin

(ii) α- Amanitin

(iii) Puromycin

(iv) Actinomycin D (5,6,4)

6. Write short notes on the following :

(a) DNA binding domains

(b) Spliceosome

(c) Sigma Factor

(d) Regulation of Gal genes in Yeast

(e) Histone modifications (15)