6/H–64 (viii) (Syllabus–2015)

2 0 2 2

(May/June)

BIOCHEMISTRY

(Honours)

(Molecular Biology)

(BCHEM–602)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks
for the questions

Answer *any* **four** questions

1. *(a)* Briefly explain the features that make DNA an ideal genetic material. 3

   (b) In 1944, a series of experiments first demonstrated DNA as the carrier of genetic information. Summarize and explain the experiments. 6

   (c) What is chromatin? Explain how chromatin compaction is achieved in genome assembly. 5

2. *(a)* Classify and explain repetitive DNA sequences in mammals.   4

(b) What are micro-satellite sequences? Briefly explain.   2

(c) Compare and contrast DNA replication process in prokaryotes and eukaryotes in detail.   8

3. *(a)* Explain in detail the composition of DNA-dependent RNA polymerase and the specific role of each associated subunits.   6

(b) In gene transcription, explain what are template and non-template strands.   2

(c) Describe the features and roles of commonly occurring non-protein coding RNAs.   6

4. *(a)* Explain the hypothesis put forward by Crick towards genetic code degeneracy in detail and its significance.   6

(b) Describe the mechanism of translation initiation in prokaryotes with illustrations in detail.   8

5. *(a)* Very briefly explain the following :   1×6=6

   (i) Negative regulation

   (ii) Positive regulation

   (iii) Repressor

   (iv) Inducer

   (v) Operon

   (vi) Polycistronic mRNA

(b) What are inducible and constitutive genes? Explain their biological significance in prokaryotes.   4

(c) Describe the specific role of CRP in *E. coli* gene expression regulation.   4

6. *(a)* What is a cloning vector and its composition? Mention the commonly employed vectors and their features.   4

(b) What is DNA amplification? Mention the technique in detail that can amplify DNA fragment *in vitro*.   7

(c) Briefly list the potential applications of quantitative PCR.   3

7. *(a)* What is bioinformatics? Briefly explain its main components.   4

(b) Explain in what ways bioinformatics has revolutionized the study of genes and proteins.   4

(c) Mention and explain any two available online bioinformatics databases that can be utilized in mining genomic and proteomic informations.   6

★ ★ ★