

M. SC. (BIOCHEMISTRY)

(MSCBCH)

Term-End Examination

June, 2025

MBC-002 : CELL AND MOLECULAR BIOLOGY

Time : 3 Hours

Maximum Marks : 100

Note : Answer any *five* questions. All questions carry equal marks.

1. (a) Discuss the structure, types and functions of collagen and elastin. 10
- (b) How do small and large molecules move across the cell membrane ? Explain with the help of a suitable diagram. 10
2. (a) What is C-value paradox ? Discuss its salient features and significance in genomic study. 2 + 8

(b) Explain the following : $5 + 5 = 10$

(i) Chromosome banding pattern

(ii) Histone proteins

3. (a) Define the following terms in 2-3 lines :

$5 \times 2 = 10$

(i) Shine-Dalgarno sequence

(ii) Pseudogene

(iii) Mitochondrial cristae

(iv) Uniport transport

(v) Okazaki fragment

(b) Describe activation of amino acids during protein synthesis in *E.coli*. 5

(c) Write the mechanism of the following protein synthesis inhibitors : $5 \times 1 = 5$

(i) Tetracycline

(ii) Streptomycin

(iii) Rifamycin

(iv) Ricin

(v) Puromycin

4. (a) Differentiate between the following :
2×5=10
- (i) Prokaryotic and Eukaryotic RNA polymerase
 - (ii) Smooth E-R and Rough E-R
- (b) Discuss the poly-U experiment with a suitable diagram. 5
- (c) Give the salient features of genetic code. 5
5. (a) With the help of a diagram, explain the mechanism of direct DNA repair. 10
- (b) What is attenuation ? How does it work to control tryptophan operon in *E. coli* ? 2 + 8
6. (a) List and discuss the levels of control of gene expression in eukaryotes. 10
- (b) Write about any *two* the following :
5+5
- (i) Eukaryotic DNA replisome complex
 - (ii) Elongation step of bacterial DNA replication
 - (iii) Inhibitors of bacterial transcription

7. Describe any *two* of the following : $10+10=20$

- (a) Dynamic behavior of microtubules
- (b) Gap junctions
- (c) Apoptosis

8. (a) What are DNA-binding motifs ?
Explain. 10

(b) Distinguish between the following :

$2 \times 5 = 10$

- (i) Mitosis and meiosis
- (ii) Prokaryotic ribosomes and eukaryotic ribosomes.

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