

**M. SC. (HONOURS)
(BIOCHEMISTRY)
(MSCBCH)**

**Term-End Examination
December, 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) Match the following : 5×1=5

Column A

Column B

- | | | |
|-------------------|------|--|
| (1) Rifampicin | (i) | binds to 30 S subunits of bacterial ribosome |
| (2) Actinomycin D | (ii) | Inhibits peptidyl transferase activity |

- | | |
|-----------------|--|
| (3) Tetracyclin | (iii) N-linked glycosylation inhibitor |
| (4) Anisamycin | (iv) Inhibits transcription initiation |
| (5) Tunicamycin | (v) Blocks the elongation step of <i>E. coli</i> transcription |

(b) Explain the following in **2-3** lines each :

5×2=10

- (i) Simple diffusion
 - (ii) C-value paradox
 - (iii) TATA box
 - (iv) 30 nm fibre of chromatin
 - (v) Extracellular matrix
- (c) Name the organelles responsible for the following :
- 5×1=5
- (i) Protein sorting and packaging

- (ii) Autophagy
 - (iii) Cellular respiration
 - (iv) Xenobiotic metabolism
 - (v) mRNA synthesis
2. (a) Write a detailed account on cyclins and cyclin dependent kinases. 10
- (b) Discuss the Singer and Nicholson model of plasma membrane with suitable diagram and explain the various factors affecting membrane fluidity. 10
3. (a) What are monocistronic genes ? Explain their key features. 5
- (b) How is chromatin condensation regulated ? 5
- (c) Describe the steps of *E. coli* DNA replication with the help of diagrams. 10
4. (a) Differentiate between any *two* of the following : 5+5
- (i) Zinc-finger motif and Leucine-Zipper motif

- (ii) messenger RNA (mRNA) and transfer RNA (tRNA)
 - (iii) Base-excision repair and Nucleotide excision repair
 - (iv) Lactose operon and Tryptophane operon
- (b) Discuss the structure and roles of G-protein linked receptors with a suitable diagram. 10
5. (a) Explain the structure and characteristics of *E. coli* RNA polymerase. Discuss its mechanism of action. 5+5
- (b) Describe the role of enhancers and transcription factors in eukaryotic transcription. 5+5
6. (a) List and discuss the salient features of genetic code. 10
- (b) Describe the *three* steps involved in the polypeptide chain elongation in bacteria. 10

7. Write short notes on the following : $4 \times 5 = 20$

- (a) Post-transcription control mechanism in eukaryotes
- (b) Protein stability
- (c) Cell death
- (d) Topoisomerases

8. (a) What are cytoskeletal proteins ?
Describe the importance of microtubules in cell cycle. $5+5$

- (b) Enlist the different types of cell junctions. Explain any *two*. 10

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