



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2021-22

MCBACOR07T-MICROBIOLOGY (CC7)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.*

Question No. 1 is compulsory and answer any *four* questions from the rest

1. Answer any *four* questions from the following: 2×4 = 8
- (a) Why DNA helicase is considered as an important enzyme for DNA replication?
- (b) “DNA polymerase I of *E. coli* has proofreading activity” — Explain.
- (c) State the biochemical reactions involved in tRNA charging.
- (d) What is the role of the GTP molecule attached with EF-Tu?
- (e) Which steps of *E. coli* transcription is inhibited by (i) α amanitin, (ii) actinomycin D?
- (f) A cell contains genotype $I^s P^+ O^c Z^+ Y^+$. What will be the product in presence and absence of lactose in the medium?
- (g) What is the role of 16S rRNA in translation initiation?
- (h) What is codon degeneracy? Give example.
2. (a) What is the length of one helical turn of DNA double helix? Mention the diameter of the helix. 1+1
- (b) Mention the function of topoisomerase. 2
- (c) Apart from nucleus where else you can find DNA in a eukaryotic cell? Describe the nature of any such DNA. 1+3
3. (a) What is eIF4F complex? What are the functions of different sub units of this complex? 2+3
- (b) Name the eukaryotic release factors of translation. What are their roles in termination? 1+2
4. (a) What are self splicing RNAs? Schematically show the steps of self splicing in Group-I introns. 2+3
- (b) What is ‘commitment complex (CC)’ of spliceosome cycle? 2
- (c) State the role of U5 snRNA in splicing. 1

5. (a) During bi-directional replication circular DNA both daughter strands are synthesized in the progeny DNA continuously as well as discontinuously. Is it true? Justify. 2
- (b) Suppose that you carry out an experiment by growing a cell in a medium containing N^{14} and then transferred to a medium containing N^{15} . What will be the position of the bands in the density gradient centrifugation if replication was (i) Semi-conservative (ii) Conservative (iii) Discursive? 3
- (c) What is the role of gene A protein in rolling circle mode of DNA replication and where does it take place? 3
6. (a) What is the abortive initiation of transcription? 2
- (b) As the synthesis of polynucleotides is thermodynamically unfavorable due to decrease in entropy, why does DNA replication take place? 3
- (c) How can you prove that DNA replication takes place in 5'-3' direction? 3
7. (a) Transcription of the tryptophan operon is regulated not only by a repressor but also by an attenuator. How does the attenuator prevent transcription? 3
- (b) What is the role of adenyl cyclase in the synthesis of β -galactosidase? 2
- (c) Schematically represent the face of tryptophan operon in presence or absence of tryptophan. 3
8. Write short notes on: 2×4 = 8
- (a) Capping of mRNA
- (b) Translocation
- (c) Nick translation
- (d) fmet tRNA^{fmet}.

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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