



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours/Programme 3rd Semester Examination, 2020, held in 2021

MCBHGEC03T/MCBGCOR03T-MICROBIOLOGY (GE3/DSC3)

Time Allotted: 2 Hours

Full Marks: 40

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

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

1. Answer any *four* questions from the following: 2×4 = 8
 - (a) What are the difference between DNA Pol I and DNA Pol III of prokaryote?
 - (b) What is Episome? What do you mean by Hfr strain?
 - (c) In what respect is the formation of λ dgal transducing phage similar to the formation of F-prime (F')?
 - (d) What are the differences between type-I and type-II restriction enzymes?
 - (e) What is the role of sigma factor in transcription of RNA molecule?
 - (f) Indicate importance of polynucleotide kinase and phosphatase in molecular cloning.
 - (g) What types of bondings are found among nitrogenous bases with phosphate group and with the sugar derivative in a typical nucleotide?

2. (a) Draw a neat, labelled diagram of Watson Crick model of double stranded helical structure of DNA. 4+2+2
 - (b) Compare the B-DNA and Z-DNA molecule.
 - (c) What is abortive transcription?

3. (a) What happens when a prokaryotic isolated chromosome is treated with DNase and RNase separately? 3+2+3
 - (b) What do you mean by Cot Curve?
 - (c) What is importance of ter site and tus protein in prokaryotic system?

4. (a) Briefly explain the elongation step of DNA replication (with a neat schematic representation) of *E.coli* chromosomal DNA. 4+2+2

- (b) Why is transcription and translation coupled in prokaryotes but not in eukaryotes?
- (c) Why is DNA replication known as semi-discontinuous process?
5. (a) Describe the basic structure of prokaryotic promoter element and its role in transcription. 3+3+2
- (b) How does open promoter complex differ from close promoter complex?
- (c) How many subunits are found in a typical prokaryotic RNA polymerase? Mention the names of the subunits.
6. (a) Indicate the basic features of a plasmid that can be used as a cloning vector. Give one importance of each feature. 3+3+2
- (b) What is the role of rRNA, tRNA and mRNA in translation?
- (c) What are the functions of IF-1, IF-2 and IF-3 in translation?
7. (a) How are IPTG and X-gal used in selection of a recombinant clones during cloning experiments with pUC vector? 3+2+3
- (b) Why are type II restriction enzymes more important than type I and type III in molecular biology?
- (c) A transformation experiment was done in which a donor strain was $A^+B^+C^+$ and the recipient was AB^+C . During plating experiments following numbers of transformation were obtained.
- $A^+B^+C^+ = 12, A^+BC = 3, A^+B^+C^+ = 100, A^+B^+C = 135, ABC^+ = 13, AB^+C^+ = 142$
- Deduce the order of these three Genes.
8. (a) Explain about the Rho-dependent and Rho-independent termination of transcription. 3+3+2
- (b) What is the difference between Class I and Class II aminoacyl-tRNA synthetase? What is the function of methionyl-tRNA formyltransferase enzyme?
- (c) Explain the proofreading activity of DNA polymerase. What is its importance?

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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