WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 4th Semester Examination, 2022

MCBACOR08T-MICROBIOLOGY (CC8)

MICROBIAL GENETICS

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.
All symbols are of usual significance.

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

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) State the function of DNA glycosylases.

   (b) What are Iterons?

   (c) Do you consider transformation and sporulation as coupled phenomenon in *Bacillus subtilis*?

   (d) What is High Frequency Transducing (HFT) lysate?

   (e) What is the gene order, if the recombination frequencies between 3 genes are — $a-b \neq 2.6\%$, $b-d = 1.4\%$ and $a-d = 1.2\%$

   (f) State the importance of heat shock and cold shock in artificial transformation.

   (g) State the role of DNA pol V in SOS repair.

   (h) What is the difference between mutation rate and mutation frequency?

2. (a) Comment on the functions of the sensory proteins and response regulators involve in transformation of *Bacillus subtilis*. What is the role of Spo0k in transformation? (3+1)

   (b) How dimerized plasmids help in whole plasmid transformation? 4

3. (a) Draw and explain time of entry curve in context of Hfr × F^- mating. 3

   (b) State the importance of interrupted mating. 2

   (c) What is anomalous plateau value? Explain with reason. 3

4. (a) How does the reactive oxygen species cause mutation? 2

   (b) Does a frameshift cause a phenotypic change? Give reasons for your answer. 2

   (c) Can a mutation induced by HNO_2 be reverted at the same site by the treatment with HNO_2 again? Give reasons. 2

   (d) What is mutator gene? 2

5. (a) How are λdgal and λpgal transducing particles different? In what conditions these different particles are generated? What is helper phage? 2+2+1

   (b) Give a comparative account on the genetic dependency of conjugation, transformation and transduction in bacteria. 3

6. (a) What are the characteristic features of transposable elements? 2

   (b) What are Inverted repeats? Why are they common in most of the bacterial transposons? 2+2

   (c) Mention the importance of transposable elements in genetics. 2

7. (a) Describe briefly how low copy number plasmids are maintained in a bacterial cell. 2

   (b) If a plasmid is mobilizable, but non-conjugative, What functions does it lack? 2

   (c) Mention the role of tra genes in plasmid. 2

   (d) Give two salient features of Ti plasmid. 2

8. (a) What are the three major Nucleotide Excision Repair (NER) genes in *E.coli*? Briefly describe their functions. 2+2

   (b) Mention the role of the following in DNA repair/recombination: 2+2

   (i) RecBCD (ii) UVrABC endonuclease.

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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