WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 4th Semester Examination, 2022

MCBACOR09T-MICROBIOLOGY (CC9)

VIROLOGY

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 and answer any *four* questions from the rest

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

   (a) 'Helical arrangement of the capsomeres are evolutionarily favourable than the cylindrical arrangement, if stability is concerned' – Explain whether this statement is True or 'False', Considering TMV as a model.

   (b) Define Capsid and Peplomer.

   (c) What is segmented genome? Give example.

   (d) What is oncogene? Why do oncogenic viruses cause cancer only to their non-permissive host?

   (e) How can you distinguish between a temperate phage and a true lysogenic phage under laboratory condition?

   (f) How does T4 bacteriophage gets its energy to inject its genome into the host?

   (g) Comment on the genetic material of the virus SV40. What is burst size?

   (h) Why booster dose is required after getting second dose of COVID-19 vaccine?

2. (a) How can you classify viruses? Represent the Baltimore classification scheme with example of polio virus. 2+3

   (b) Suppose you want to isolate bacteriophage against *Vibrio cholerae* from sewage water. What would be the experimental procedure? 3

3. (a) How CII-CIII association helps in lysogenization of lambda phage into the *E.coli* chromosome? 3

   (b) What is the role of CRO in the life cycle of lambda phage? 3

   (c) In S mutant of lambda phage, what would be the physical abnormalities? 2

4. (a) You are provided with two *E.coli* culture E1 and E2. Culture E1 was treated with UV rays for 5 mins. and then infected with λ phage whereas culture E2 was first infected with λ phage and then treated with same dose of UV rays. After these treatments both *E.coli.* cultures E1 and E2 were incubated overnight at 37°C incubator. 2+2

   What results will you get after overnight incubation – Explain.

   (b) "Wild type mice can never get infected by Polio virus" – Justify the statement. 2

   (c) What do you mean by IRES? 2

5. (a) How does AZT and Acyclovir differs in their mode of action? 2+2

   (b) What will happen if Picorna virus infect a protease mutant host cell? 2

   (c) How can you differentiate between the mRNA and anti-genome RNA of Influenza virus. 2

6. (a) What is vaccine? How viral vaccines can be developed? 2+2

   (b) How does Prion proteins multiply within the host cell even in presence of proteases in the host cell. 2

   (c) Why T4 phages cannot produce functional progeny of the host *E.coli* is incubated at a non-permissive temperature? 2

7. (a) What are the genomic properties of adenovirus? 2

   (b) What are the mechanisms of action of amantadine? Where these drugs are used? 3

   (c) Which viral vector is most suitable for gene therapy? Comment. 3

8. (a) What is the significance of eclipse phase in one step growth curve of viruses. 2

   (b) The envelop of enveloped viruses is of host origin – Explain. 2

   (c) How can you establish protein-protein interaction using phage display? Name one virus that is being widely used in this strategy. 3+1

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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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.

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