



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours PART-III Examinations, 2018

MICROBIOLOGY-HONOURS

PAPER-MCBA-VI

Time Allotted: 4 Hours

Full Marks: 100

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

Use separate Answer Book for each Group.

Group – A

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

1. Answer any *five* questions from the following: 2×5 = 10
 - (a) Name the causative agents of HIV mediated Tuberculosis and tetanus.
 - (b) Distinguish between endotoxin and exotoxin.
 - (c) What is cytopathic effect?
 - (d) Define terminal redundancy. State an example.
 - (e) What are opportunistic pathogens?
 - (f) What are Koch's postulates?
 - (g) Name the different classes of interferon you have studied.

2. (a) Diagrammatically represent the process of integration of λ DNA with *E.coli* chromosome during lysogeny. Mention the names of the enzymes required for the integration and excision of prophage. 4+2
 - (b) State the molecular mechanism involved in the process of induction of prophage. 3
 - (c) Define 'immunity to super infection'. 1

3. (a) Depict the major morphological types of symmetry of viral capsids. Briefly state the formation of these capsid structures with one example of each type. 2+4
 - (b) Temperate phages generally choose lysogeny when MOI is high – Explain. 2
 - (c) Schematically represent the process of prion replication. 2

4. (a) Normal microflora of human body prevents the establishment of pathogen – Explain. 2
(b) Write a note on skin microflora of human body. 3
(c) Differentiate endotoxin from exotoxin of bacteria. 2
(d) Why diphtheria considered as a toxemia? State its mode of action. 1+2
5. (a) What is M.O.I.? 2
(b) At which M.O.I. the one step growth experiment of *E. coli* and T₄ phage is performed and why? 1+2
(c) What is intracellular growth curve experiment? 2
(d) Describe an experimental procedure of isolation of cholera phage from natural source. 3
6. (a) What is the function of N protein in lambda phage life cycle? 2
(b) How cerebral malaria is caused? State its symptoms. 3
(c) If CI⁻ mutant *E. coli* strain is mixed with wild type CI *E. coli* strain and then allowed to grow and plated, which type of plaques will be generated. Explain. 3
(d) How CI protein establishes the lysogeny? 2
7. (a) What are the genomic property of TMV? 2
(b) What is the function of reverse transcriptase of HIV? 2
(c) What is WAART? State its advantage. 1+2
(d) How it can be proved that T₄ phage use *E. coli* RNA polymerase during its transcription? 3
8. (a) State the essential features of ICTV. 3
(b) Why is Bovine Spongiform encephalopathy caused? What are its symptoms? 1+2
(c) MDT and DOT are important tools for the treatment of which disease and why? 2+2

Group-B

Answer Question No. 9 and any four questions from the rest

9. Answer any *five* questions from the following: 2×5 = 10
(a) Why are antibodies called biological adaptor molecules?
(b) Why RBCs of an individual are not normally destroyed as a result of innocent bystander lysis by complements?

- (c) Define endogenous and exogenous antigens.
- (d) Write down two reasons of the development of autoimmunity. Give example.
- (e) State the advantage of monoclonal antibody.
- (f) What are the advantages of DNA vaccines over the traditional vaccines?
- (g) Name the interleukine first produced by the Thelper cells and does it act?
- 10.(a) How important is positive and negative selection in Thymus for T cell development? 2+2
- (b) CDRs play the most important role in antigen recognition – Explain. 2
- (c) State the structural and functional differences among different IgG subtypes. 4
- 11.(a) Somatic hypermutation is very important in generation of antibody diversity – Explain. 4
- (b) Explain why a V_H segment cannot join directly with a J_H segment in heavy chain gene rearrangement. 4
- (c) Name the causative agents of inflammation. 2
- 12.(a) 95% of the T cells express $\alpha\beta$ TCR and only 5% of T cells express the $\gamma\delta$ TCR. What are their functions? 4
- (b) How CD4 differs from CD8? 3
- (c) Why do lymph nodes swell in an infection? 3
- 13.(a) How monoclonal antibodies are produced in laboratories? 5
- (b) Neutrophils are the first cells to reach the site of an infection – how do neutrophils enter to the tissue from blood? 5
- 14.(a) What is role of chaperones during antigen presentation by the help of MHC class I molecules? 3
- (b) Complement reactions are effective against gram-ve bacteria – Explain. 2
- (c) Define the term– Self-MHC restriction. 2
- (d) Define epitope. What are immunodominant epitopes? 1.5+1.5
- 15.(a) Mention the properties of an immunogen that contribute to its immunogenicity. 2
- (b) Distinguish between serum IgA and secretory IgA. 3

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| (c) What is hematopoiesis? | 1 |
| (d) Name two secondary lymphoid organs of the human body. | 0.5+0.5 |
| (e) Explain the antiviral role of IFN α , β in human body. | 3 |
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| 16.(a) What is passive agglutination? | 2 |
| (b) What are agglutinins? | 1 |
| (c) How does agglutination inhibition act as a sensitive assay method for small amounts of antigen? | 3 |
| (d) Which types of interactions are responsible for the formation of antigen-antibody complexes? | 2 |
| (e) What is immunofluorescence? | 2 |