2019

(April)

BIO-CHEMISTRY

(Honours)

(Microbiology and Immunology)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **four** questions, taking **two** from each Part

PART—A

(Microbiology)

1. Discuss the following with respect to their use as criteria in the classification of bacteria : 8+6=14

(a) Morphological and physiological characteristics

(b) Molecular characteristics

2. (a) Define 'growth'. Why would cells from log phase when inoculated into fresh medium have a shorter log phase than those that have been stored? 2+3=5

(b) How does a continuous culture system differ from a closed culture system/ batch culture? 5

(c) Define generation time and mean growth rate constant. 4

3. (a) Calculate the growth rate and generation time of a culture that increases in the exponential phase from 10^3 cells to 10^9 cells in 10 hours. 3

(b) Describe the role of microorganisms in food-borne diseases. 5

(c) Describe how chemostats and turbidostat operate. How do they differ? 6

PART—B

(Immunology)

4. Answer the following :

(a) Distinguish the features of innate and adaptive immunity. 6

(b) Discuss the role of phagocytes in innate or non-specific immunity. 8

(Continued)

5. (a) Explain what cytokines are. Mention the cytokines that play significant roles in adaptive immune system. 1+3=4

(b) Describe three ways in which complement system acts to protect the host during infection. 4

(c) Define each of the following : 6

Immunity ; Antigen ; Antibody

6. Describe briefly the following : 7+7=14

(a) Cell-mediated immune response

(b) Genetic basis of creation of antibody diversity

7. Write notes on any *two* of the following : 7×2=14

(a) Clonal selection theory

(b) Monoclonal antibodies and its application in biology

(c) Autoimmune diseases

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Answer *any* **four** questions

1. *(a)* What is a nucleosome? Explain how it is the fundamental unit of organization of chromosomes. 2+6=8

(b) What is linking number? Explain briefly the enzyme(s) controlling linking number. 6

2. *(a)* Describe the organization of bacterial DNA. 5

(b) What is DNA supercoiling? Discuss its importance. 1+4=5

(c) Explain telomeres. 4

3. (a) What is Klenow fragment? Discuss its features. 2+4=6

(b) Explain the *E. coli* DNA Pol III subunit composition and its functions. 8

4. (a) What are positive and negative gene regulations? Discuss with examples. 8

(b) Discuss catabolite repression of the *lac operon*. 6

5. (a) What is miRNA? Briefly explain their biogenesis in eukaryotes. 1+5=6

(b) What are ribozymes? Discuss their roles in RNA metabolism. 1+7=8

6. (a) Explain the role of adapter molecule during translation. 5

(b) Mention the significance of ribosomal binding site in prokaryotic transcripts. 5

(c) Which are the usual initiator codon and initiator tRNA in prokaryotes? Show the step in the formylation of met-tRNA$_f$. 1+3=4

(Continued)

7. (a) Mention the usefulness of protein data bark available online. 5

(b) Describe YAC and BAC in molecular cloning. 5

(c) Describe how the selection of organisms containing recombinant DNA is achieved? 4

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