2021

MOLECULAR BIOLOGY & BIOTECHNOLOGY

[HONOURS]

Paper : V

Full Marks : 75 Time : 4 Hours

The figures in the right-hand margin indicate marks. Candidates are required to give their answers in their own words as far as practicable.

UNIT–I

[Marks : 50]

1. Answer any **two** from the following questions: 1×2=2

   a) Name one chemolithotrophic bacterium.

   b) Name the light sensitive pigment found in halophiles.

   c) Which of the following is **false** about fimbriae?

      i) Composed of pilin

      ii) Found in Gram negative cells

      iii) Present in hundreds per cell

      iv) Mostly used in motility

[Turn over]

   d) The Embden-Meyerhof Pathway is an example of amphibolic pathway. (Mark **True** or **False**)

2. Answer any **five** from the following questions: 2×5=10

   a) Name two free-living nitrogen fixing bacteria.

   b) How can amoebiasis be controlled?

   c) Name two bacteria which use hexosemonophosphate shunt.

   d) What do you mean by lysogenic conversion?

   e) Comment on the germ theory of diseases.

   f) What is Pasteurization?

   g) What is rhizospheric effect?

3. Answer any **three** from the following questions: 6×3=18

   a) Write a short note on Koch's postulates. 6

   b) Differentiate between lytic and lysogenic cycles of replication of bacteriophages. 6

   c) Sketch the different stages of bacterial growth. Mathematically deduce the generation time of bacterial growth. 2+4

   d) Classify bacteria on the basis of their nutrition. Give examples. 3+3

e) Briefly discuss the ultra-structure of bacterial flagella. 6

4. Answer any **two** from the following questions: 10×2=20

a) Differentiate between cell-walls of Gram positive and Gram negative bacteria. Comment on bacterial capsule and stalk. 6+4

b) Discuss the mode of entry of pathogen and control measures of any two diseases:

Cholera, AIDS and Malaria. 5+5

c) Describe briefly anoxygenic photosynthesis in phototrophic bacteria mentioning specific examples, carbon sources and electron donors. What are the different pathways of carbon dioxide assimilation in phototrophic bacteria? 7+3

d) How HFr-strains are produced from F^+ bacterial culture? What is the significance of transposition? 8+2

UNIT–II

[Marks : 25]

5. Answer any **three** from the following questions: 1×3=3

a) What do you mean by antibody cross-reactivity?

b) What is the site for B cell maturation in human?

c) State true or false : $C3_bB_b$ is also known as C5 convertase.

d) What is toxoid?

e) What is MALT?

6. Answer any **three** from the following questions: 2×3=6

a) Mention the basic strategies for developing vaccines.

b) Describe in brief the basic principles of RIA.

c) Describe the names of secondary lymphoid organs of human body.

d) What is the basic principle of identifying human blood groups?

e) State the difference between heavy chain and light chain of an immunoglobulin molecule.

7. Answer any **one** from the following questions: $6\times1=6$

a) What are the major functions of the complement system? Briefly describe the steps involved in Haematopoiesis. 3+3

b) Write down the differences between a haematopoietic stem cells and progenitor cells? What do you mean by primary and secondary immune response? Give two examples of each of primary and secondary lymphoid organs. 2+2+2=6

8. Answer any **one** from the following questions: $10\times1=10$

a) What is Rh antigen? Briefly describe the activation pathway of the lectin pathway? Describe the steps involved in indirect and competitive ELISA. $2+3+2\frac{1}{2}+2\frac{1}{2}$

b) Write short notes (any **two**): $5\times2=10$

i) NK-cell mediated cytotoxicity

ii) Antigen presentation

iii) Structure of immunoglobulin that cross placental barrier

iv) RIA