D 4021

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Third Semester

Biotechnology

BT 1204 – MICROBIOLOGY

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the three entities of the three-domain classification system.

2. Briefly explain the prokaryote/eukaryote divide.

3. Define the term endosymbiosis.

4. List the three major kinds of bacterial cell wall with respect to their composition.

5. List two main functions of bacterial capsule in the pathogenic process.

6. What are the methods used to measure bacterial cell mass?

7. What is continuous culture? Name the instrument used to achieve that state?

8. Discuss in brief the major methods of sterilization.

9. What are opportunistic pathogens and list two major opportunistic pathogens?

10. Briefly differentiate primary and secondary metabolites.

PART B — (5 × 16 = 80 marks)

11. (a) Describe in detail the principle and working of an electron microscope and explain the differences between scanning and transmission electron microscopy based on its mechanism.

Or

(b) Describe the structure of the lipopolysaccharide (LPS) of gram-negative bacteria. How are LPS molecules held together? Where is the LPS located in the cell? What effect does bacitracin have on LPS assembly?

12. (a) Give a detailed account of bacteriophage lifecycles and illustrate the same with a cartoon.

Or

(b) Describe the structural hierarchy and multiplication processes found in bacteria.

13. (a) What roles do any FIVE of the following amino acids play in protein structure and/or enzyme activity :

(i) proline,

(ii) histidine,

(iii) cysteine,

(iv) serine,

(v) valine or leucine,

(vi) lysine or arginine,

(vii) aspartic acid or glutamic acid.

Or

(b) Describe the roles that trace metals, including iron, play in bacterial biochemical pathways. Give examples from several different pathways. You should mention 4 or 5 different metals and explain their different roles.

14. (a) Explain how resistance plasmids protect bacteria against antibiotics. What are the major mechanisms of resistance found on plasmids? Give examples for two classes of antibiotic. How do the plasmid-specified resistance mechanisms differ (in a general way) from those observed for chromosomal mutants?

Or

(b) What are two major kinds of bacterial adherence to host? Briefly describe any five bacterial adherence factors important for pathogenesis. Draw the structure and explain the function of bacterial flagella.

15. (a) Explain how nitrogen fixing root nodule works. How do the bacteria enter and produce the nodule? What role does leghemoglobin play? What is provided by the plant and what is provided by the symbiotic bacteria?

Or

(b) Explain in detail the uses of microbes in ore leaching, pollution control and biosensor applications.
