2021

MICROBIOLOGY — HONOURS

Second Paper

(Group - A)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer *question no.* **1** and *any four* questions from the rest.

1. Write short notes on the following :   2×5
   (a) Acid fast staining
   (b) Mode of action of nalidixic acid
   (c) Endospore germination
   (d) Whittaker's Five Kingdom concept
   (e) Cationic surfactant.

2. (a) State the contribution of Louis Pasteur and Winogradsky in microbiology.
   (b) How can the dimensions of a bacterium be measured?
   (c) How can you ensure synchronous growth in bacterial cultures? Why is it sometimes necessary to have a synchronous culture?
   (d) With graphical representation describe different stages of bacterial growth.   2+2+3+3

3. (a) How does superoxide dismutase protect a cell?
   (b) Draw a growth curve of bacteria at 42ºC and compare that to one obtained at 37ºC.
   (c) Differentiate between plasmid and chromosome.
   (d) Describe the reasons behind multidrug resistance.   2+3+2+3

4. (a) Differentiate bacterial kingdom based on their nutritional mode.
   (b) What are the metabolic uniqueness in sulphur lithotrophs?
   (c) How are reduced sulphur compounds oxidized by sulphur lithotrophs?   4+3+3

5. (a) 'Bacteria tend to stain more readily with cationic dyes.'— Justify the statement.
   (b) What measures will you take to sterilize an operation theatre?
   (c) What speciality do the Archae harbour to allow them to grow at extreme environments?
   (d) What is teichoic acid?   2+3+3+2

Please Turn Over

6. (a) Mention the action of quinolones on microbes.

   (b) Why is negative staining very useful to understand the morphology of bacteria? Why is it called negative staining?

   (c) Briefly discuss the factors that influence the effectiveness of antimicrobial drug.

   (d) Explain why penicillin has no effect on *Mycoplasma spp*.

   (e) Who disproved the Theory of Spontaneous Generation and how?   2+2+2+1+(1½+1½)

7. (a) Describe how the following can control the growth of bacteria :

      (i) Halogen, (ii) Dye, (iii) Ethanol

   (b) How do you sterilize a chemical solution which is heat labile?

   (c) What is the principle of sterilization using moist heat?

   (d) Why has it been said that the membranes are fluidic. Explain the composition and characteristics of bacterial cell membrane.   3+1+2+4

8. (a) Differentiate between the following :

      (i) Rhizopus and Mucor

      (ii) Simple staining and Differential staining

      (iii) Cilia and Flagella (in eukaryotes)

      (iv) Thermophiles and Thermodurics.

   (b) Phycomycetes are considered as primitive fungi— why?   (4×2)+2

9. (a) Starting with 100 bacterial cells/ml in a nutrient-rich medium with 1 hour lag phase and 20 mins generation time, how many cells will there be after 2 hours?

   (b) What is phenol coefficient? State its limitations.

   (c) How does capsule contribute to the pathogenicity of the bacterial cell?

   (d) What are the features of Rhodophyta for which they are considered to be of advanced character?
               3+(1+2)+2+2

10. (a) Compare among magna, minuta and cyst forms of Entamoeba.

   (b) What are SASPs? Write its functions.

   (c) What is meant by a bud scar and a birth scar in *Saccharomyces cerevisiae*?

   (d) Give an example of complex bacterial medium. State the functions of each of the ingredients of that medium.   3+2+2+(1+2)