

2020

MICROBIOLOGY — HONOURS

Paper : CC-2

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 three** questions from the rest.

1. Answer **any ten** questions : 2×10
- (a) What do you mean by numerical aperture of a microscope?
 - (b) How do you sterilise / disinfect the following :
 - (i) Serum (ii) Laminar air flow hood.
 - (c) What are the major differences between the genus *Bacillus* and *Escherichia*?
 - (d) Gram staining is not possible for *Mycobacterium tuberculosis*. Explain why.
 - (e) Why biological concept of species is not applicable to prokaryotes?
 - (f) Why members of genus *Mycoplasma* are insensitive to Penicillin?
 - (g) With suitable example state the differences between selective and differential media.
 - (h) How do chemolithotrophs differ from chemoorganotrophs?
 - (i) What are auxotrophs? Give an example.
 - (j) Lysozyme can affect Eubacterial cell wall but cannot affect Archaeobacterial cell wall. Why?
 - (k) What do you mean by Polyphasic Taxonomy?
 - (l) What is the role of SASP in protecting *Bacillus subtilis* endospore against UV mediated damage?
 - (m) What are endoflagella? Name a bacterium in which it is present.
 - (n) What are the major characteristic features of archaeobacterial cell membrane?
 - (o) Why 16s rRNA gene is considered as an excellent evolutionary chronometer in bacterial systematics?
2. (a) How can non-culturable bacteria be accessed?
- (b) Deduce the relationship $g = \frac{t}{n}$, where the symbols have their usual meaning.
- (c) Calculate n and g for a bacterial population that has a lag phase of 1 hour, and then grows exponentially for 5 hours from 2×10^4 cells to 4×10^{10} cells.
- (d) Discuss the antimicrobial properties of phenolics. 3+2½+2½+2

Please Turn Over

3. (a) Draw a labelled diagram to depict the stages of bacterial sporulation.
(b) What is the role of R-plasmids in the spread of multi-drug resistance in bacteria?
(c) Why obligate anaerobes are sensitive to oxygen? Mention one method for the cultivation of anaerobes. 3+3+(2+2)
4. (a) What is systematics? How is it different from taxonomy?
(b) What do you mean by 'oligodynamic action' of metals?
(c) What is the role of mordants in staining procedures?
(d) Diagrammatically represent the mechanism of image formation in bright field microscopy. (1½+1½)+2+2+3
5. (a) Oil immersion objective gives a better resolved image than dry objectives in light microscopy. Explain why.
(b) How do you obtain a pure bacterial culture from a mixed bacterial population?
(c) State two characteristic features of α -proteobacteria.
(d) How is a spheroplast formed?
(e) State the role of vitamins in bacterial growth. 2+2+2+2+2
6. Write short notes on : 2½×4
- (a) Bacterial Porins
(b) Chromatic aberrations
(c) Gram staining
(d) Continuous culture.
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