

2015

**BIOCHEMISTRY**

**Paper – BCT – 102**

**(Microbiology)**

**Full Marks – 25**

*The figures in the margin indicate full marks*

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

Answer **any five** questions taking at least **two** questions from each group

**Group – A**

1. (a) Bacteria are divided into two broad groups : Gram positive and Gram negative. Is it possible to place Mycoplasmas in these groups ? Explain your answer.  
(b) Why are cell walls of gram-negative bacteria generally resistant to the action of lysozyme ?  
(c) How do the bacteria bind to the cell surface ? 2+2+1
  
2. (a) What are the characteristics of bacterial endospores ? What govern of bacteria form these bodies ? 2+1  
(b) What are porins ? Where do they occur ? 2
  
3. (a) What are bacteriorhodopsin and halorhodopsin ? 2  
(b) How do halophiles survive in saturated brine ? 2  
(c) What are stenothermal microorganisms ? 1
  
4. (a) What is Biofilm ? Why is Biofilm formations considered as the most important reason for antibiotic resistance now-a-days ? 2+2  
(b) What is Quorum sensing ? 1
  
5. (a) What is Stringent response ? How do RelA function in stringent response ? 1+2  
(b) How do facultative anaerobe survive both in presence and in absence of oxygen ? 2

[ Turn Over ]

6. (a) What is the function of teichoic acid in cell wall structure ?  
 (b) How does  $\sigma$  (sigma) factor regulate endospore formation in *Bacillus subtilis* ?  
 (c) What is  $\delta$  layer ? 2+2+1

### Group – B

7. (a) Distinguish between the mechanisms of antibacterial action of coumarins and fluoroquinolones.  
 (b) How do you demonstrate experimentally that the target site of streptomycin is the 30S subunit but not the 50S subunit of 70S ribosome ?  
 (c) Briefly state the mode of action of ethylene oxide. 2+2+1

8. (a) Define 'F value' in sterilization process ? Briefly discuss its significance in the food sterilization process ?  
 (b) Using 'Z value', explain the effect of Pasteurization on pathogens and the milk components (such as vitamins).  
 (c) How do you determine the number of endospores present in 1 gram of soil sample provided to you ? (1+1½)+1½+1

9. (a) Which of the following is not an aminoglycoside antibiotic ?  
 (i) Streptomycin, (ii) Neomycin,  
 (iii) Kanamycin, (iv) Cephalosporin
- (b) Who developed the concept of specific toxicity ?  
 (i) Pasteur, (ii) Flemming,  
 (iii) Watson, (iv) Ehrlich
- (c) Suramin, an antiparasitic drug, was derived from :  
 (i) acridine orange, (ii) methylene blue,  
 (iii) trypan blue, (iv) bromophenol blue
- (d) Which of the following methods would be most appropriate for sterilizing an antibiotic solution ?  
 (i) Dry heat sterilization, (ii) Membrane filtration,  
 (iii) UV-radiation, (iv) Tyndallization
- (e) The antibiotic which affords a broad spectrum of antimicrobial coverage against aerobic and anaerobic bacteria, rickettsiae, chlamydiae, and mycoplasmas is :  
 (i) gentamycin, (ii) metronidazole,  
 (iii) tetracycline, (iv) vancomycin

10. (a) Briefly discuss the mode of action of  
(i) an antiviral agent. 9- $\beta$ -D-arabinofuranosyladenine (ara-A)

**Or**

- (ii) an antimalarial drug, chloroquine.  
(b) How do you experimentally demonstrate that rifampicin inhibits bacterial transcription at initiation stage but not at elongation stage?  $2\frac{1}{2}+2\frac{1}{2}$

11. (a) Distinguish between the mechanisms of antimicrobial action of sulfamehtoxazole and trimethoprim, which act as metabolic antagonist.

- (b) Give an example of antifungal polyene macrolide and briefly discuss its mode of action.  $2+(1+2)$

12. (a) Some of the bacterial species develop streptomycin resistance by creating mutation at S12 protein of 30S ribosomal subunit. Indicate how they can develop streptomycin resistance by other mechanism?

- (b) What type of microorganism is affected by vancomycin? How vancomycin kills the susceptible microorganism? How some of these microorganisms may develop vancomycin resistance?  $2+(1+1+1)$

13. (a) Draw a growth curve for *E. coli* growing in synthetic media containing both glucose and lactose as sole carbon sources.

- (b) Why coliphages are used as pollution indicator?  
(c) Phenol coefficient values of compound A, B, C are 4.5, 1.0 and 0.45, respectively. Compare the antimicrobial efficacy of these compounds with respect to phenol.

- (d) Give an example of triaminotriphenyl methane stains.  $2+1+1+1$