



**WEST BENGAL STATE UNIVERSITY**

B.Sc. Honours Part-I Examination, 2019

**MICROBIOLOGY**

**PAPER-MCBA-IIA**

Time Allotted: 2 Hours

Full Marks: 50

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable.  
All symbols are of usual significance.*

**Answer Question No. 1 and any four from the rest**

1. Answer any **five** questions from the following: 2×5 = 10
  - (a) What is an axenic culture?
  - (b) Why Archaean cell wall is insensitive to lysozyme, but Eubacterial cell wall is sensitive?
  - (c) What is bacteriostatic agent ? How it differs from bactericidal agent?
  - (d) What is magnetosome? Where is it found?
  - (e) What are chemoorganotrophs and chemolithotrophs?
  - (f) Differentiate between plasmid and episome .
  - (g) Define Periplasmic space with function.
  - (h) Distinguish between sterilization and disinfection.
  - (i) What are selective media and differential media?
  
2.
  - (a) What are the differences between stain and dye? 2
  - (b) Why tannic acid is applied in case of flagella staining? 2
  - (c) How will you stain and observe endospore of an endospore-forming bacteria? 2
  - (d) What is Lysol? What is mercurochrome? 2+2
  
3.
  - (a) How will you sterilize the following materials:  $\frac{1}{2} \times 4 = 2$ 
    - (i) Apron (ii) Plastic Petri plates (iii) Fruit juices (iv) Operation theatre in hospitals.
  - (b) How will you detect malaria parasite in the human blood? What is trophozoite? 2+1
  - (c) What are the characteristics of reproduction of Ascomycetes? 3
  - (d) What are ionizing radiations? 2
  
4.
  - (a) What are the differences between biogenesis and abiogenesis? How did Louis Pasteur disprove the theory of abiogenesis? Explain diagrammatically. 2+3
  - (b) What are the contributions of Edward Jenner and Joseph Lister in microbiology?  $1\frac{1}{2} + 1\frac{1}{2} = 3$
  - (c) What is the principle of Acid fast staining? 2
  
5.
  - (a) Define phenol coefficient. What is thermal death time? 1+1
  - (b) Folic acid and sulfonamide simultaneously added to a sensitive cell — Explain. 2
  - (c) Why growth factor analogs exhibit selective toxicity? 2

- (d) Write the mechanism of action of the following antimicrobial agents: 2×2  
 (i) Halogens (ii) Alcohols
6. (a) Why do you think viruses are not included in the five kingdoms or three domain classifications? 2  
 (b) What are the advantages of three domain classification over five kingdom classification? 2  
 (c) *Streptococcus* grows by fermentation. Why is *Clostridium* killed by oxygen, whereas a *Streptococcus* is not? 3  
 (d) Propose a model for the assembly of a flagellum in a Gram positive membrane. How would that model need to be modified for the assembly of a flagellum in a Gram negative membrane? 3
7. (a) What is chemostat? How it differs from turbidostat?  $1\frac{1}{2} + 1\frac{1}{2} = 3$   
 (b) If the generation time is 40 minutes and the initial population contains  $10^1$  cells, how many bacteria will there be after 10 exponential growths? 2  
 (c) Calculate the mean growth rate and generation time of a culture that increases in the exponential phase from  $5 \times 10^2$  to  $1 \times 10^{10}$  cells in 10 hours. 2  
 (d) Draw the following growth curves for *E.coli*, starting with 10 cells with a generation time of 30 minutes at 37°C: 1+1+1  
 (i) The cells are incubated for 6 hours at 37°C.  
 (ii) After 6 hours, the temperature is changed to 20°C for 3 hours.  
 (iii) After 6 hours at 37°C, the temperature is changed to 6°C for 3 hours followed by 37°C for 6 hours.
8. (a) Diagrammatically explain the postulates of Robert Koch. 2  
 (b) Define Synchronous growth. Why the graphs of the synchronous growth loses its sharpness with time? 2+1  
 (c) What is pseudomurein? How is it similar to peptidoglycan? How is it different? 1+1+1  
 (d) Explain the features of an ideal antibiotic. 2
9. (a) Differentiate between any *two* of the following:  $2\frac{1}{2} \times 2 = 5$   
 (i) Exospores and Endospores  
 (ii) Morphological staining and cytological staining  
 (iii) Dry heat sterilization and moist heat sterilization.  
 (iv) Pasteurization and sterilization.
- (b) Write short notes on any *two* of the following:  $2\frac{1}{2} \times 2 = 5$   
 (i) Mode of action of penicillin  
 (ii) Phylogenetic classification of Bacteria  
 (iii) Fractional sterilization  
 (iv) Endosymbiotic theory.

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