



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2023

MCBACOR04T-MICROBIOLOGY (CC4)

Time Allotted: 2 Hours

Full Marks:

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 questions from the rest

1. Answer any **four** questions:

2×4 =

- Define hyper-parasitism with proper example.
- What do you mean by phosphate solubilization? Give two examples of phosphate solubilizing bacteria.
- Why denitrification is unwanted to farmers?
- How PGPR promote plant growth?
- What do you mean by soil profile? Draw the soil profile of terrestrial environment.
- What are the advantages of COD over BOD to indicate the water pollution level?
- A water sample has MPN index/100 ml of 1100. What does it signify?

2. (a) What do you mean by tertiary treatment of water?

2+3+

(b) How an aerobic waterway becomes anaerobic after addition of wastes? Explain diagrammatically.

(c) Mention the various steps of municipal water purification.

3. (a) What is acid rain?

2+3+2+

(b) What do you mean by phosphate immobilization? Explain with proper example.

(c) Composting is a efficient method for recycling solid waste. Justify the statement.

(d) Why activated sludge is so called?

4. (a) Why lichen is considered as a mutual association?

2+3+

(b) How microbes survive in low temperatures? Explain with proper example.

(c) Write a comparative note on freshwater and marine microflora.

- (a) What are the strategies of pesticide remediation? 2+(2+2)+(1+1)
- (b) What are organochlorine pesticides? Give two examples of bacterial genera those degrade organochlorine pesticides.
- (c) Give one example of each of nematophagous fungi and symbiotic luminescent bacterium.
- (a) Write a comparative note between amensalism and commensalism with proper example. 3+3+2
- (b) Differentiate epiphytes and endophytes with proper example.
- (c) Define ecto-mycorrhiza with proper example.
- (a) What do you mean by sulfate reduction? Explain with proper reaction and example. 3+3+2
- (b) What do you mean by symbiotic and non-symbiotic interactions between microbes-plants?
- (c) Define phytoremediation with proper example.
3. (a) Mention the role of mycorrhiza in plant growth. 3+2+3
- (b) What do you mean by microbial succession?
- (c) Mention the beneficial role of human microflora.

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WEST BENGAL STATE UNIVERSITY
B.Sc. Major 2nd Semester Examination, 2024

MCBDSC202T-MICROBIOLOGY (MAJOR)

Full Marks: 50

Time Allotted: 2 Hours

*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 Number 1 and any four questions from the rest

2×5 = 10

1. Answer any *five* questions:

- What are firmicutes?
- What is phenol coefficient?
- What do you mean by sphaeroplast?
- Write the name of one basic and one acidic dye.
- Why endospores are resistant to adverse condition?
- E. coli* is an opportunistic pathogenic bacterium — Why?
- What are Crenarchaeota?
- What are sex fimbriae?

2. (a) Write short notes on:

- Thermococcus*
- Halococcus*.

- Write the general characteristics of high G+C content bacteria.
- What are L-form bacteria?
- What are ROS? Give example.

3. (a) What are the major differences between eubacteria and archaeobacteria?

- Define synchronous growth with proper example.
- What is the function of a mordant?
- Why are *Mycoplasma* not affected by penicillin?
- What are auxotrophs?

4. (a) Define selective media with example.

(b) State the role of the counter stain in Gram staining process.

(c) What are barophiles? Give two examples of barophilic bacteria.

(d) Discuss the role of heavy metals in microbiological control with proper example.

2+2

3

1

2

4

1+1

1

2

1

1+1

2

1+2

2+1

5. (a) Define the Diauxic growth curve. 2
 (b) Classify the bacteria on the basis of their temperature and oxygen requirements. 4
 (c) What do you mean by plasmolysis and plasmoptysis? 2
 (d) What is the generation time of 100 bacterial cells which were growing logarithmically for 5 hours and produce 1.7×10^6 cells? 2
6. (a) What is resolving power, limit of resolution and numerical aperture of a Microscope? What is the relation between them? 1+1+1+1
 (b) Briefly describe the basic principle of phase contrast microscope with proper diagram. $2\frac{1}{2} + 1\frac{1}{2}$
 (c) What are the differences between SEM and TEM? 2
7. (a) What do you mean by phylogenetic tree? 2
 (b) Define Morphovar, Biovar and Serovar in bacterial taxonomy. 1+1+1
 (c) Why is rRNA a good "Evolutionary Chronometer"? 2
 (d) What are molecular approaches for taxonomic identification of a microorganism? 3
8. (a) How does chemostat differ from turbidostat? 2
 (b) What is protoplast? 1
 (c) Describe the ultrastructure of bacterial flagella. 3
 (d) What benefits bacteria get from their small size? 2
 (e) What is the basis of acid fastness of *Mycobacterium*? 2
- x—



WEST BENGAL STATE UNIVERSITY

B.Sc. Major 2nd Semester Examination, 2025

MCBDSC202T-MICROBIOLOGY (MAJOR)

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.*

Question Number 1 is compulsory. Answer any four questions from the rest.

1. Answer any *five* questions: 2×5 = 10
 - (a) What is growth factor and why they are important?
 - (b) Why archaebacterial cell wall is insensitive?
 - (c) What is dolipore septum?
 - (d) Define the term "Digenetic parasite".
 - (e) What is protoplast?
 - (f) What do you mean by signature sequence?
 - (g) What is staircase phenomenon?
 - (h) What are inclusion bodies? Give example.

2. (a) Differentiate between microaerophiles and facultative anaerobes. 3
 - (b) What is the significance of serial dilution in pour plate method? 2
 - (c) What are the functions of the following enzymes? 1½ + 1½
 - (i) Superoxide dismutase, (ii) Catalase.
 - (d) Deduce the relationship: $g = \frac{t}{n}$; where the symbols have their usual meaning. 2

3. (a) Write short notes on: 2+2
 - (i) *Thermoproteus*, (ii) *Methanobacterium*.
 - (b) Write the general characteristics of low G+C content bacteria. 3
 - (c) What are sphaeroplasts? 1
 - (d) What are barophiles? Give one example. 2

4. (a) Write the role of algae in agriculture. 3
 - (b) What is auxospore? Where does it occur? 1+1
 - (c) What is meant by "Alternation of Generation"? 2
 - (d) Name the pigments and storage products that can be observed in Rhodophyceae. 3

- ✓ 5. (a) What are cyanobacteria? 2
 (b) What is CV-I complex? 2
 (c) What are autotrophs? 2
 (d) Define diauxic growth with proper example. 2
 (e) Give two examples of Gammaproteobacteria. 3
6. (a) What is the generation time of 1000 bacterial cells which were growing logarithmically for 10 hours and produce 1.5×10^5 cells? 1
 (b) What is a phylogenetic tree? 1
 (c) For which purpose 16S rRNA sequencing method is used? 1
 (d) What is Evolutionary chronometer? 4
 (e) What are the different stages of sporulation? Give proper diagram. 2
- ✓ 7. (a) State the role of quaternary ammonium compounds to control microbial growth. 2
 (b) What do you mean by "oligodynamic action of metals"? 2
 (c) Moist heat is preferred than dry heat to sterilize culture media. — Justify the statement. 2
 (d) What is the mechanism of action of radiation for the purpose of sterilization? 3
 (e) What is HEPA filter? 1
- ✓ 8. (a) Write short notes on: 2+2
 (i) Phenol and phenolics as antimicrobial agent
 (ii) Detergent as antimicrobial agent.
 (b) How disinfectants differ from antiseptics? Give suitable example. $1\frac{1}{2} + 1\frac{1}{2}$
 (c) What are chemolithotrophs? Give example. 2
 (d) What is a pili? 1
- ✓ 9. (a) How prions differ from viroid? 2
 (b) How does archaea differ from eubacteria? 2
 (c) Why obligate anaerobes are sensitive to oxygen? 3
 (d) What is continuous culture? 1
 (e) What are the different types of symmetry found in viruses? 2

① capsid
 ② icosahedral
 helical
 complex