KAMARAJ COLLEGE (Autonomous)

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(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(4 Pages) **Reg. No:……**

Question Code: 26E01519 **Course Code: 25UMMB21**

UG Degree - End Semester Examinations, April 2026

Second Semester

B.Sc., Microbiology

Microbial Physiology and Metabolism

(For those who joined in June 2025 onwards)

Time : 3Hours **Maximum : 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

CO:1 K:1 1. Which phase of the bacterial growth curve is characterized by adaptation without cell division?

(a) Log phase (b) Lag phase

(c) Stationary phase (d) Death phase

CO:1 K:2 2. Choose the correct reason why turbidity increases during the log phase.

(a) Cells are dying rapidly (b) Cells are metabolically inactive

(c) Cell number increases exponentially (d) Nutrients are exhausted

CO:2 K:1 3. Which of the following is a photoautotroph?

(a) *Nitrosomonas* (b) *Cyanobacteria*

(c) *Lactobacillus* (d) *E. coli*

CO:2 K:2 4. What happens during symport transport mechanism?

(a) Two molecules move in opposite directions (b) Two molecules move in the same direction

(c) Movement without carrier protein (d) No energy involvement

CO:3 K:1 5. Which enzyme converts pyruvate into acetyl-CoA before entering the TCA cycle?

(a) Hexokinase (b) Pyruvate dehydrogenase

(c) ATP synthase (d) Lactate dehydrogenase

CO:3 K:2 6. Choose the correct statement about oxidative phosphorylation.

(a) ATP is formed without electron transfer (b) Occurs in the absence of oxygen only

(c) ATP is produced using proton gradient (d) Does not involve electron transport chain

CO:4 K:1 7. Which cycle is involved in carbon fixation during photosynthesis?

(a) TCA cycle (b) Calvin cycle

(c) EMP pathway (d) HMP pathway

CO:4 K:2 8. What is the main difference between cyclic and non-cyclic photophosphorylation?

(a) Only cyclic produces ATP (b) Non-cyclic produces both ATP and NADPH

(c) Cyclic produces oxygen (d) Non-cyclic occurs in cytoplasm

CO:5 K:1 9. Which one of the following is the most common method of bacterial reproduction?

(a) Budding (b) Binary fission

(c) Conjugation (d) Population

CO:5 K:2 10. Choose the correct reason for endospore formation.

(a) Rapid multiplication (b) Genetic variation

(c) Survival under adverse conditions (d) Survival under adverse conditions

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 250 words.

CO:1 K:2 11. (a) Explain the phases of the bacterial growth curve.

(OR)

(b) Illustrate the batch and continuous culture systems of micro-organisms.

CO:2 12. (a) Describe the mechanisms of active transport in bacteria.

K:4

(OR)

(b) Demonstrate the characteristics of phototrophs and chemotrophs with examples.

CO:3 13. (a) Outline the steps of the Embden–Meyerhof pathway.

K:4

(OR)

(b) Distinguish between homolactic and heterolactic fermentation.

CO:4 14. (a) Compare cyclic and non-cyclic photophosphorylation.

K:4

(OR)

(b) Differentiate the light reaction and dark reaction of photosynthesis.

CO:5 15. (a) Examine the process of binary fission in bacteria.

K:4

(OR)

(b) Contrast asexual and sexual reproduction in fungi

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).

Answer should not exceed 500 words.

CO:1 16. (a) Analyze the factors affecting microbial growth and methods of measurement.

K:4

(OR)

(b) Examine the significance of synchronous and asynchronous cultures in microbiology.

CO:2 17. (a) Analyze various nutritional groups of microorganisms with suitable examples.

K:4

(OR)

(b) Differentiate the membrane transport systems involved in bacterial survival.

CO:3 18. (a) Assess the role of the TCA cycle and oxidative phosphorylation in bacterial energy production.

K:5

(OR)

(b) Explain the different types of fermentation with suitable examples.

CO:4 K:6 19. (a) Design a schematic explanation of chloroplast structure and the mechanism of photosynthesis.

(OR)

(b) Formulate a model describing the Calvin cycle and its significance in carbon fixation.

CO:5 K:4 20. (a) Compare the different modes of bacterial and reproduction.

C(OR)

(b) Categorize the mechanisms of endospore formation in relation to bacterial survival and pathogenesis.