

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FOURTH SEMESTER EXAMINATION, MAY 2015

SECOND YEAR

MICROBIOLOGY (Honours)

Paper : IV

Date : 22/05/2015

Time : 11 am – 2 pm

Full Marks : 75

[Use a separate Answer book for each group]

Group - A

[Answer any five questions]

1. a) State three characteristic features of ubiquitin. [3]
b) Mention any two cellular responses to protein misfolding. [2]
c) Write the mechanism of separation of sister chromatids at the end of metaphase of cell division. Which protein is said to be the “engine” of cell cycle? [3+1]
2. a) Design an experiment to demonstrate that secretory proteins are localized to the endoplasmic reticulum lumen shortly after synthesis. [3]
b) What are chaperovins? [2]
c) What is the characteristic difference between eukaryotic and prokaryotic proteasomes? [2]
d) What aspects of protein structure influences the life-span of cellular proteins? [2]
3. a) What are pheromones? Mention the role of pheromones in mating of yeast cells. Give illustration. [1+3]
b) What will happen if an animal cell in “S” phase is fused with another cell of M phase of the life cycle. How can you explain the phenomenon? What is adhesin? [1+2+1]
c) What is meant by the term ‘proteostasis’? [1]
4. a) Differentiate between the Monolactic and Heterolactic fermentation with examples. [2+2]
b) What consequences would occur to the nucleic acid metabolism if an eukaryotic cell is unable to uptake/synthesize Glutamine? [3]
c) What is the biological basis of arsenite poisoning? [2]
5. a) A cell can metabolised glucose by the glycolytic pathway and by the pentose phosphate pathway. How could you determine the contribution of the shunt pathway towards the glucose metabolism? [3]
b) What is the biochemical basis of phenylketonuria? [2]
c) Redox loop mechanism contradict exit level of proton from matrix to intermembrane space — justify. [2]
d) Define chemolithatrophy. Give the major sources of energy. [2]
6. a) What are CAM plants? [3]
b) Briefly explain the reaction catalyzed by Acetyl CoA carboxylase. [3]
c) ‘No net synthesis of amino acid takes place via transamination’ —Justify with example. [3]
7. a) A *trans* Δ^2 / *cis* Δ^4 fatty acid is isomerized to *trans* Δ^2 / *cis* Δ^6 stereoisomer. Explain how it can be utilized to yield energy. [3]
b) How is adenine catabolized in invertebrate that essentially has a non-functional purine 3 – nucleotidase? [3]
c) Briefly explain the signaling pathway involved in yeast mating factor response. [3]
8. a) Write the function of Cdc 25C protein in cell cycle. What is dynein? [3]
b) Briefly describe the major topological classes of integral membrane proteins synthesized on the rough endoplasmic reticulum. Explain with proper diagram. [3]
c) Distinguish between oxygenic and anoxygenic photosynthesis. [1.5+1.5]

9. a) TCA cycle is amphibolic in nature —Justify. [3]
- b) How will you convert alanine to acetate? [2]
- c) 2 ATP molecules are utilized in β – oxidation of fatty acid —Explain. [2+5]
- d) How does uncoupler help in generating body heat? [1+5]

Group - B

[Answer **any three** questions]

10. a) Mention two physical and one chemical factors which influence microbial growth in soil. [3]
- b) State the mechanisms of microbial solubilization of inorganic phosphates in soil. [3]
- c) Which organisms cause mastitis? Write down the symptoms of mastitis. [1+2]
- d) Mention the organism that acts as a source of phosphatase in milk. [1]
11. a) Write the symptoms of the disease-red rot of sugarcane and also mention the name of causal organism of this disease. [3+1]
- b) Write the differences between the zymogenous and autochthonous bacteria of soil. [3]
- c) What are the sources of microorganism in meat? [1]
- d) What are the symptoms of Salmonellosis? [2]
12. a) Present the sulfur cycle in a flow chart. What is meant by dissimilatory sulfate reduction? [3+2]
- b) What is the difference between a compost and vermicompost. [2]
- c) Write the steps in cheese making indicating the role of microorganisms in this process. [3]
13. a) Name the stages in the life cycle of the rust pathogen. Mention the role of each stages. [5]
- b) Write the roles of Nod factor and nodulin protein in nodulation process in host plant. [3]
- c) What is ropy milk? What are the principal organisms causing ropy milk? [1+1]
14. a) What is meant by cross inoculation group? [2]
- b) State the roles of GS/GOGAT enzymes in nitrogen assimilation. [2]
- c) What is rhizosphere? [1]
- d) What is bacteriocin? [2]
- e) Write down the health benefits of probiotic bacteria. [3]
15. a) What are the differences between the cooperation and ammensalism? [2]
- b) Differentiate between food borne infection and food poisoning. [2]
- c) Name a disease of rice caused by virus. Name the vector of this disease. [2]
- d) Mention two examples of microbial pest control. [2]
- e) What is M-cell? [2]

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