RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FOURTH SEMESTER EXAMINATION, MAY-JUNE 2013

SECOND YEAR

Date : 20/05/2013 **Microbiology (Honours)**

Time : 11am – 3pm Paper : IV Full Marks : 75

(Use separate answer book for each group)

Group – A

Answer any **five** questions

1. a) What is meant by dissimilatory reduction of nitrate in nitrogen cycle? 2
   b) With suitable example, describe the process of ammensalism among microorganisms. 2
   c) Write down the structural and functional peculiarities of nitrogenase associated with nitrogen fixation. 3

2. a) Write the differences between symbiotic and non-symbiotic nitrogen fixation. 1½
   b) What are the steps or sequence of reaction in the carbon cycle? 2½
   c) Write short notes on: ammonification, denitrification. 3

3. a) What is appertization? 2
   b) Write down the pathogenicity of Salmonellosis. 3
   c) Mention the preventive and control measures of Salmonellosis. 2

4. a) What is 'pasteurization' of milk? 2
   b) Give the role of microorganisms in the manufacture of ripened cheese. 2
   c) Explain the terms: putrefaction, fermentation, rancidity. 3

5. a) What are the features of food preservatives through the use of radiation and high temperature? 3
   b) Differentiate between probiotics and prebiotics. 2
   c) Why milk is regarded as the nearly perfect food? Why is it an excellent culture medium? 2

6. a) Mention the importance of "Signal Sequence" in the transport of secretory proteins through the membrane. 2
   b) Briefly describe the "SRP pathway" of protein targeting. 4
   c) What is cotranslational translocation? 1

7. a) What is 'hydrophobic collapse' in the protein folding process? 2½
   b) How ubiquitin works in conjunction with a proteasome? 3½
   c) Give the name of a disease related to protein misfolding. 1

8. a) What is the role of yeast sec 61 inside the cell? 2
   b) What happens in the 'S' phase of the cell cycle? 2
   c) Write a short note on the 'class switching' of yeasts. 3

9. a) A human cell fusion experiment was conducted in which cells at different stages of the cell cycle were found to yield a single cell with two nuclei. What will happen if

(i) Cells in G1 fused with cells in S.
(ii) Cells in G1 fused with cells in M.
(iii) Cells in S fused with cells in M.
What can be concluded from this experimental result? 4

b) What will happen if the cdc 2 gene in fission yeast is mutated? 1

c) What is meant by checkpoints in the cell cycle? Write the significance of the presence of checkpoints in the cell cycle. 2

10. a) Which type of microorganisms produce methane gas? What is the natural habitat of these microbes? 2

b) What are biofertilizers? 1

c) Give an account of the following plant diseases: late blight of potato and red rot of sugarcane. 4

Group – B

Answer any **five** questions

11. a) What is enzymatic decarboxylation of amino acid? Give example. 2

b) State the sub-cellular sites of urea cycle. Show its links with TCA cycle. 1+2

c) "Patients with phenylketonuria excrete phenylpyruvate in urine – explain. 2

d) Give example of 2 ketogenic amino acids. 1

12. a) Differentiate between oxygenic and anoxygenic photosynthesis. 3½

b) What is the role of accessory pigments in photosynthesis? 2½

c) Where is the photosynthetic apparatus located in plants and bacteria? 2

13. a) How do monosaccharides other than glucose may enter into glycolysis? 3

b) Compare the action of oligomycin and 2,4-DNP as an uncoupler. 2

c) Gluconeogenesis is not the exact reversal of glycolysis – Justify. 3

14. a) Why the hydrolysis of ATP molecule releases a high amount of energy? 3

b) Define the term: oxidative phosphorylation. 2

c) What are the features of chemiosmotic theory proposed by Peter Michell on oxidative phosphorylation? 3

15. a) Describe briefly (i) Heterolactate fermentation, (ii) Alcoholic fermentation 1½+1½

b) Complex I, Complex II, Complex III are not collinear – Justify. 2

c) What is the significance of succinate Dehydrogenase and the reaction catalyzed by this enzyme? 3

16. a) What is the role of glycogen phosphorylase and glycogen debranching enzyme in glycogen breakdown process? 3

b) Give the name of different enzyme constituent of the pyrurate dehydrogenase multienzyme complex? 2

c) Why a defective G6PD confers a selective advantage to an individual against severe malaria? 3

17. a) What is the significance of xanthine oxidase in nucleotide metabolism? 3

b) What reaction does thymidylate synthase catalyze? What is the significance of the cofactor used in this reaction? 2+3

18. a) What is the name of the process by which fatty acids are oxidized? Also give the role of carnitine in the translocation of fatty acid across the mitochondrial membrane. 3
    b) What are the minor pathways occurring in the bacteria for the metabolism of carbohydrates? 2
    c) What is Z-scheme? 1
    d) Give the name of the enzyme which fixes CO_2 in photosynthesis occurring in plants. 2

19. a) What is 'Stickland reaction'? 2
    b) Extend the term 'annamox'. 1
    c) How does the glyoxylate cycle convert acetyl CO-A to oxaloacetate? 3
    d) Phosphofructokinase is the major target for regulation of glycosis – discuss briefly. 2

20. a) What are the differences between chemolithotrophs and photolithotrophs? 3
    b) What is the function of F_0F_1ATPase? 2
    c) In which form is vitamin B_6 utilized in amino acid metabolism? Briefly mention the role of this form of vitamin. 1+2