RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2019

SECOND YEAR (BATCH 2017-20)

Date : 16/05/2019 **MICROBIOLOGY (Honours)**

Time : 11.00 am – 3.00 pm **Paper : IV** Full Marks : 100

[Use a separate Answer Book for each group]

Group – A

(*Answer <u>any five</u> questions*) [5×10]

1. a) What are the different mating types of yeast? (1)
   b) How the mating behaviour of yeast is determined genetically? Which genes are responsible for switching mating types? (3+2)
   c) Briefly discuss the role of SRP pathway in cotranslational translocation of proteins in bacterial cells with a suitable diagram. (4)

2. a) What do you mean by inflammatory immune response? What are its symptoms? (4+2)
   b) How the polio vaccine is prepared? (3)
   c) What is toxoid? (1)

3. a) What do you mean by oxygen dependent killing within phagolysosomes? (3)
   b) What do you mean by opsonisation? (2)
   c) Define decarboxylation and deamination reactions with example. (2+2)
   d) Name one glucogenic and one ketogenic amino acids. (1)

4. a) Explain the glucose-alanine cycle. (4)
   b) What is Krebs's bicycle? Why is it so called? (1+2)
   c) Briefly explain the role of Pyridoxal-5P in metabolism. (3)

5. a) Arsenate is very toxic to most organisms. Explain why? (2)
   b) "Native proteins are soluble while denatured proteins are not" - why? (2)
   c) What is stick land reaction? (2)
   d) ATP is substrate as well as regulator for PFK1 enzyme. Why does it so? (2)
   e) How many ATPs are produced from one Molecule of glucose? (2)

6. a) Write down the occurrence and significant of EDP pathway in prokaryotes. (3)
   b) Write down the importance of following enzymes in galactose metabolism: (3×1)
      i) Galactokinase
      ii) Uridyltransferase
      iii) Phosphoglucomutase
   c) Write down the regulation of PDH complex involved in TCA cycle. (3)
   d) Name one protein denaturing agent. (1)

7. a) What will happen in the following cell fusion experiments with human cells at different stages of cell cycle-
      i) Cells at G1 fused with S phase cells
      ii) Cells at G1 fused with cells at M-phase
      iii) Cells at M-phase fused with cells at S-phase

What would be your conclusion from your observations? (3)

b) Briefly mention the mechanism of congression of mitotic chromosomes during metaphase. (3)

c) How does p53 play an essential role in the arrest of cell cycle in G1 phase, if the DNA is damaged by irradiation? (2)

d) How is bipolar spindle formed in dividing plant cells? (2)

8. a) Briefly mention the intrinsic pathway of apoptosis. (3)

b) What is the significance of phosphatidylserine in apoptosis. (2)

c) What will happen to cell cycle if *cdc* 25 C gene is mutated? (2)

d) How does anaphase promoting complex (APC) plays an important role in the anaphase separation of chromosomes? (3)

9. a) Mention the features of apoptotic cells. (2)

b) What is embryonic stem cell? How those cells are used for therapies of genetic diseases? Can adult cell be converted into stem cell? (2+2+1)

c) Define

i) Molecular Chaperones (1.5)

ii) Nucleoplasmins (1.5)

Group – B

(*Answer <u>any five</u> questions*) [5×10]

10. a) What do you mean by soil texture? How many soil textual classes exist? (2+1)

b) Define bioleaching citing an example. (2)

c) What are soil colloids? (3)

d) How do autochthonous bacteria differ from zymogenous bacteria? (2)

11. a) What do you understand by 'synergism' & 'symbiosis'? Are they interrelated? (3)

b) What is predation? Give an example. (2+1)

c) How does rhizosphere differ from rhizoplane? (2)

d) What is nitrogenase complex made up of ? (2)

12. a) What are the different casein proteins present in milk? How do they form casein micelle? (2+2)

b) What is rennet? Write down its main natural source. How does rennet coagulate milk? (2+1+3)

13. a) Name one foodborne illness caused by a Gram negative bacteria. Also mention the mechanism of the exotoxin produced by it. (1+3)

b) What is the difference between spoiled food and fermented food? (2)

c) Mention the significance of prebiotics in the survival of probiotic organisms. (2)

d) What is starter culture? (2)

14. a) Write the differences between the pathogenicity and virulence factors in respect of plant diseases. (2)

b) Resistance(R) in host in dominant to susceptibility(r) in host plant whereas avirulence(A) is dominant to virulence(a) in pathogen. What will be the host-parasite interaction if pathogens with genotypes a_1A_2 and A_1a_2 are inoculated to R_1r_2 and a_1R_2 respectively? (2)

c) Mention two advantages & one disadvantage of nitrogen cycle. (2+1)

d) What are microbial inoculants? Name two examples. (2+1)

15. a) State the causes of annual recurrence of wheat rust disease in India. (3)
    b) How does reduced water activity & Low pH helps in the preservation of food? (2+2)
    c) Mention the three significant roles of phosphorous cycle. (3)

16. a) Which group of microorganisms is concerned with methanogenesis. Name the substrates used for methane production. Name two unique coenzymes participate in this process. (1+1+2)
    b) Mention the reasons when the cell undergoes phagocytosis. (3)
    c) Present a flow-chart depicting the sulphur cycle in nature. (3)

17. a) State the symptoms of red rot disease of sugarcane and mention the name of the pathogen. (2+1)
    b) State the importance of phenolic compounds in plant organs as a measure of defence against plant pathogen. (2)
    c) Cite the first example of variolation. How does it differ from vaccination. (1+2)
    d) Name a disease caused by Tungo virus. Give a control measure for it. (1+1)

18. a) State the role of "special pair" of chlorophylls in initiating photochemical reaction in photosynthetic bacteria. (2)
    b) How does oxygen evolving complex play a significant role in electron transport from water to Reaction Centre(RC) at PSII of green plants. (3)
    c) Electron transport from PS-II to PS-I during photosynthetic light reaction causes a net influx of two protons occur from strome to thylakoid lumen per electron transported. State the mechanism of this process. (3)
    d) How does thioredoxin exert its role in controlling Calvin cycle? (2)

19. a) How can you prove the existence of avirulence genes in plant pathogen? If they do exist at all, cite two examples. (3)
    b) In tropical hot climate C_4 plants will outcompete C_3 plants if they are allowed to grow on a lawn alongside. How do they so? (3)
    c) How do carotenoids protect the photosynthetic apparatus under too high light intensity? (2)
    d) State the roles of growth regulator in the development of disease in the host plants. (2)

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