RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, SEPTEMBER 2020

SECOND YEAR (BATCH 2018-21)

Date : 26/09/2020 **MICROBIOLOGY (Honours)**

Time : 11.00 am – 7.00 pm **Paper : IV** Full Marks : 100

Group – A

(Answer **all** the questions)

1. a) Design an experiment to prove that dividing cells require a cytoplasmic factor for transition from G_2 to M phase of mitosis.
   b) What would happen if an animal cell line with a mutation in p21 gene is irradiated?
   c) How can you prove that the flow of electron occurs from water to $NADP^+$ during photosynthesis in green plants?
   d) What do you mean by "a special pair" of chlorophyll in the context of photosynthesis?
   e) Why is yeast considered as a model organism in laboratory?
   f) Mention important differences between the life cycle of budding yeast and fission yeast.

   [2+2+2+1+1+2]

2. a) Mention the nature and importance of signal sequences present in secretory proteins.
   b) Briefly outline Chris Anfisen's experiment on protein folding; State the observations made and the conclusions derived.
   c) Outline four prospective applications of regenerative medicines.
   d) State the characteristics of signal sequence for protein targeting in bacterial system.
   e) Name a few N-terminal amino acid residues which can confer shorter half-life to proteins.

   [2+3+2+2+1]

3. a) Differentiate between hexokinase and glucokinase.
   b) What happens when 2,4 DNP is added to electron transport chain.
   c) Write down the roles of UQ and cytochromes in electron transport chain.
   d) ATP is both substrate as well as regulator of PFK1 enzyme in Glycolysis. Explain this fact.

   [2.5+2+(1.5+1.5)+2.5]

4. Write down the reactions catalyzed by the following enzymes: [2 × 5]
   a) Glutamine PRPP Amidotransferase
   b) GAR Transfromylase
   c) Carbamoyl phosphate Synthetase 2
   d) Thymidylate Synthase
   e) Xanthine Oxidase

5. a) How are polyunsaturated fatty acids oxidized by beta oxidation in vivo?
   b) How much ATP is generated from one molecule of Palmitic acid beta oxidation?
   c) What is Krebs bicycle? Why is it so called?
   d) In what form is Vit B6 utilized in amino acid metabolism? Give a reaction.
   e) Name 2 amino acids that are purely ketogenic. [3+2+2+2+1]

GROUP-B

(Answer **all** the questions)

6. a) What are the starter cultures for yoghurt? Is there any symbiotic growth relationship between them?

   b) How does *Salmonella* sp. invade host cells during pathogenesis?

   c) What do you mean by fermented foods? [(1+4)+4+1]

7. a) Do you think that fermented foods are spoiled food? Justify. Write down three important benefits of fermented foods.

   b) Explain mutualism and commensalism with suitable example. [(2+3)+5]

8. a) What are the different soil particles and how would you differentiate them?

   b) Write two important characteristics of fine textured soil.

   c) To produce disease resistant varieties in crop plants is really a challenging and continuous process. What would be the steps to develop resistance in a crop plant variety against different strains of a pathogen?

   d) If small seedlings growing in pot are frequently watered it has been seen that the seedlings are frequently showing wilting just above the soil surface. Why?

   [(1+2)+2+3+2]

9. a) How can you prove the presence of "*avr*" gene in any pathogen for which it is incapable to cause infection on a specific host plant variety?

   b) How does the hypersensitive reaction operate in host plant to defend a pathogen?

   c) To fulfill three conditions are the pre-requisites for establishing pathogenic relationship with a host. What are these and how do they influence in pathogenesis?

   d) Mention two important causes of annual recurrence of wheat rust disease in India.

   e) State the basic difference between phytoalexin and phytoanticipin.

   [2+2+3+2+1]

10. a) Innate and adaptive immunity act in cooperative and interdependent way to protect the host. Discuss the collaboration of these two forms of immunity.

    b) Write down three features of secondary immune response that distinguishes it from primary immune response.

    c) Why antigen processing and presentation is necessary in immune system?---Explain.

    d) Innate immunity can be seen to comprise four types of defensive barriers……Given below some example of types of barrier providing agent or event that produce barrier; categorize what type of barriers are they and how they play the role in non-specific immunity.

    i) sebum
    ii) neutrophils
    iii) lysozyme
    iv) Tissue damage [2+2+2+ (1×4)]

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