RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, DECEMBER 2017

THIRD YEAR [BATCH 2015-18]

Date : 19/12/2017 **MICROBIOLOGY [Honours]**

Time : 11 am – 1 pm **Paper : V [Gr-B]** Full Marks : 50

***Answer any five questions* :** [5×10]

1. a) Briefly mention how adaptive immunity is different from Innate Immunity. [3]
   b) Distinguish between Hapten and Adjuvants. [2]
   c) What are Complementarity Determining Regions? How many CDRs are found in a IgG molecule? [2+2]
   d) What types of MHC molecules are expressed on the surface of human red blood cells? [1]

2. a) Design an experiment to prove that topological structure is essential to function as a B-cell epitope. [3]
   b) Write a brief account on Antibody Avidity. [2]
   c) Inspite of low binding affinity than IgG, why does IgM shows better complement activity? [2]
   d) What are the two primary characteristics that distinguish hematopoietic stem cells and progenitor cells? [2]
   e) B cell epitopes have site mobility —Explain. [1]

3. a) Define monoclonal antibody. How is hybridoma technology used for generation of monoclonal antibody? [1+3]
   b) A researcher wanted to make a rabbit antiserum specific for mouse IgG. He injected a rabbit with purified mouse IgG and obtained an antiserum that reacted strongly with mouse IgG.
   In addition, the serum also reacted with each of the other mouse Isotypes. Explain why he got this result?
   How could he make the rabbit antiserum specific for mouse IgG? [2+2]
   c) Differentiate between MHCI and MHCII. [2]

4. a) Define : (i) Allotype (ii) Desitope. [1+1]
   b) What are B cell surface antigens? [2]
   c) Given the blood sample of a suspected Hepatities B infected patient. Describe a procedure by which you can confirm whether the patient is infected or not. [3]
   d) With regard to T-cell maturation, Explain : (i) Negative selection (ii) Positive selection. [1·5+1·5]

5. a) Briefly justify whether the following statements are true/false : [1·5+1·5]
      i) Air lift bioreactors are known as pneumatic reactors.
      ii) Antibodies are primary metabolites
   b) What is a Bioreactor. Write about the advantages of using airlift fermentors in industrial production. [1+3]
   c) Define downstream processing. How do flocculation and liquid-liquid extraction help in downstream processing? [1+2]

6. a) How is crowded plate technique used for isolation of an antibiotic producing microbe? [2]

   b) What are the strategic differences between the fermentative production of an antibiotic and an enzyme? [3]

   c) Biosynthesis of penicillin involves non-ribosomal peptide synthesis —Justify the statement in your own words. [2]

   d) Outline the flow chart of penicillin production in large scale. [3]

7. a) Differentiate between Immobilized enzyme and Immobilized cells? [2·5]

   b) ‘‘Many strains of alcohol producing organisms lose their productivity of alcohol concentration 5 – 7% by volume in fermentation medium”. How do you solve this problem in fermentation plant? [3]

   c) What is clarification and aging process. [2]

   d) Describe the fermentation process involved during industrial production of alpha amylase. [2·5]

8. a) Why is orifice sparger preferred over the porous sparger. [2]

   b) List the disadvantages of batch fermentations. How could you overcome these disadvantages? [1·5+1·5]

   c) Why is submerged culture fermentation process advantageous over the surface culture process? [3]

   d) How does *E.coli* auxotrophic mutant fermentate L-lysine industrially? [2]

9. a) How does normal flora provides protection to the skin? [2]

   b) Why is vulvovaginities most prevalent during pre-puberty and post-menopausal periods? [2]

   c) Write down the major characteristics of exotoxin. Name one exotoxin with its producer organism. [2+1]

   d) Write a brief account on cause and remedy of septic shock syndrome. [1·5+1·5]

10. a) Why do some bacteria show tissue specificity during adhesion to host cells? [2]

    b) Write down the difference between localized and systemic infection. [2]

    c) What is the portal of entry of pathogenic bacteria? Mention the sites of entry. [1+2]

    d) Write down the mode of action of cholera toxin with suitable diagram. [3]

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