RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2014

THIRD YEAR

Date : 09/05/2014 **MICROBIOLOGY (Honours)**

Time : 11 am – 1 pm **Paper :** VII Full Marks : 50

Group – B

[Use a separate Answer book for each Unit]

Unit - I

1. Answer **all** the questions : [5×2]
   a) What are allergens? Give one example. [2]
   b) "Pentameric IgM can activate complement system, but circulating IgM cannot."— Why? [2]
   c) What is Rhogam? Highlight its role on treatment of erythroblastosis foetalis. [2]
   d) How do you determine the concentration of IgE in a given serum sample? [2]
   e) What is subunit vaccine? [2]

Answer **any one** question :

2. a) Complement activation can occur via the Classical, Alternative or Lectin pathway.
      i) A) How do the three pathways differ in the substances that can initiate activation? [1½]
      B) Which portion of the overall activation sequence differs in the three pathways? Which portion is similar? [1½]
      ii) Write down the differences between immediate and delayed type hypersensitivity reactions. [2]
      iii) What are the advantages and disadvantages of using live attenuated organisms as vaccines? [3]
      iv) Explain Innocent-bystander lysis. [2]

   b) i) Explain how our own cells protect themselves from the attack of our activated complement system? [3]
      ii) An antibody (X) binds to a topographical epitope of an antigen (Y). Due to partial structural similarity, the antibody (X) also binds weakly to Bovine Serum Albumin (BSA). Given the antibody (X), an antigen solution is supplied to you. Devise an experiment by which you can determine whether the supplied antigen is (Y) or BSA. [3]
      iii) You have been supplied 5 culture samples of an exotoxin secreting bacteria (C). The exotoxin it produces has a Binding subunit (b) that binds to target host cell and an Activity subunit (a) that causes pathogenesis. Justify which one may be the best for use as vaccine.

      Sample 1: Live bacteria (C) with functional (b) subunit but nonfunctional (a) subunit.

      Sample 2: Live bacteria (C) with nonfunctional (b) subunit but functional (a) subunit.

      Sample 3 : Live bacteria (C) with both functional (a) and (b) subunit.

      Sample 4 : Live bacteria (C) grown at abnormal pH in monkey kidney epithelial cells.

      Sample 5 : Live bacteria (C) with both nonfunctional (a) and (b) subunit. [4]

Unit - II

3. Answer **all** the questions : [5×1]
   a) Which antibiotic inhibits bacterial transcription?
   b) Name a sporulating human pathogen.
   c) Write down the mode of action of erythromycin.
   d) How does a bacterium become resistant to chloramphenicol?
   e) How would you define generation of antibiotics?

Answer **any one** question :

4. a) i) Write down the name and mechanism of action of the antifungal drugs acting on cell membrane, cell wall and the process of cell division. [(½+1½)×3]

   ii) Give two examples of quinolone/fluoroquinolone antibiotics. Explain their mechanism of action as antibacterials. [1+3]

   b) i) What is cord factor? Write down its function. [1+1½]

   ii) Explain how *M. tuberculosis* survives the antimicrobicidal actions of macrophages after internalization within the phagosomes. [3]

   iii) Write down the name and function of any three virulent factors present in *Neisseria gonorrhoeae*. [(½+1)×3]

5. Answer **all** the questions : [5×1]

   a) What is "crown" region of HIV antigens?

   b) What is the function of P^{53}?

   c) What do you mean by IRES?

   d) What do you mean by cytopathic effect?

   e) Name an oncogenic virus.

6. Answer **any one** question :

   a) i) Compare the entry of animal viruses along with bacteriophages. [2]

   ii) How does influenza virus replicate in host cell? [3]

   iii) What are the latent antigens produced by EBV? [2]

   iv) Why the poliovirus preferentially attacks the central nervous system? Why polio causes paralysis of the legs? [1½+1½]

   b) i) What are the diseases associated with HTLV? [2]

   ii) Why does some adenovirus infection induce apoptosis? [3]

   iii) What are prions? Give examples. Name one human, one bovine prion disease. What are the different types of macromolecules that may constitute a prion? [2+1+1+1]