M.Sc. BIOTECHNOLOGY
THIRD SEMESTER
IMMUNOLOGY
MBT-302

Duration: 3 Hrs. **Marks: 70**

PART: A (OBJECTIVE) = 20
PART: B (DESCRIPTIVE) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins. **Marks: 50**

[Answer question no. One (1) & any four (4) from the rest]

1. What do you understand by antigen-antibody interaction? Derive 'Scatchard equation' for interaction of a univalent ligand to a multivalent antibody. (2+8=10)

2. Differentiate between innate and adaptive immunity. What are the cells involved in adaptive immunity? Explain the attributes of adaptive immunity. (3+3+4=10)

3. Explain the structure of antibody and class I MHC molecule with suitable diagram. Write about adjuvants and its types. (6+4=10)

4. Define complement system. Explain the mechanism of activation of classical pathway of complement activation. Write how complement components neutralizes viral infection. (1+6+3=10)

5. Write a brief note on the cells of the immune system. What is secondary follicle? Explain the structure of lymph node and write about its function during antigenic challenge. (4+1+5=10)

6. Write the principle of passive agglutination. Give a diagrammatic description of the important phases of agglutination. How this process is advantageous over precipitation? (2+6+2=10)

7. Discuss the postulates of Erhlich's "side-chain theory". Describe the process of monoclonal antibody production following hybridoma technique. (3+7=10)

8. Add brief notes on *any two* of the following: (5×2=10)
   a) Precipitation curve.
   b) Ouchterlony Gel Diffusion.
   c) Radioimmunoassay.

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[PART-A: Objective]

Choose the correct answer from the following: **1×20=20**

1. Ig idiotypes are found:
   a. in the constant region of the heavy chain.
   b. in the constant region of the light chain.
   c. in the variable region of both heavy and light chains.
   d. only in the light chain.

2. Complement component C3 is cleaved by:
   a. C3b
   b. C3bBb
   c. factor B
   d. factor D

3. Precipitation reaction can be converted into agglutination reaction by coating soluble antigen:
   a. bentonite particles
   b. latex particles
   c. RBC
   d. all of the above

4. In sandwich ELISA:
   a. primary antibody is found free in the microtitre well.
   b. primary antibody is bound to the antigen in the well.
   c. antibody is absent.
   d. primary antibody is bound to the well.

5. The Ig that mediates allergic reaction:
   a. IgG
   b. IgE
   c. IgA
   d. IgD

6. Alternate pathway of complement system is involved in:
   a. non-specific defense b. innate immunity
   c. adaptive immunity d. both (a) and (b)

7. In which of the following case a large lattice is formed?
   a. antibody in excess.
   b. antigen in excess.
   c. both antigen and antibody in optimal concentration.
   d. all of the above.

8. Secreted IgM is a:
   a. a pentamer with 10 antigen binding sites.
   b. tetramer with 8 antigen binding sites.
   c. monomer with 2 antigen binding sites.
   d. none of the above.

9. Which of the following statement is true?
   a. all immunogens are antigens but all antigens are not immunogen.
   b. all immunogen are antigen and all antigen are immunogen.
   c. all immunogens are antigens and all antigens are immunogens.
   d. none of the above.

10. A given myeloma protein:
   a. has a homogenous amino acid structure.
   b. has a constant H chain but both kappa and lambda L chain.
   c. is produced by different plasma cell clones.
   d. does not behave as an antibody.

11. The classical and alternative pathways meet at complement component:
   a. C1
   b. C5b
   c. C4b
   d. C3

12. Which class region encodes the 'classical antigens': HLA-A, B and C?
   a. I
   b. II
   c. III
   d. both (a) and (b)

13. The ability of an individual antibody to react with one epitope or ability of a population of antibody to react with only one antigen is termed as:
   a. affinity b. avidity
   c. specificity d. cross reactivity

14. The binding between antigen and antibody in Ag–Ab reaction is due to:
   a. closeness between antigen and antibody.
   b. non–covalent bonds or intermolecular forces.
   c. affinity of antibody.
   d. all of the above.

15. Antibody attaches to carrier particle instead of antigen is the principle of:
    a. passive agglutination.
    b. passive indirect agglutination.
    c. reverse passive agglutination.
    d. direct agglutination.

16. "Erythroblastosis fetalis", commonly develops when an Rh^+ fetus expresses an Rh antigen on its blood cells that the Rh^- mother does not express, is a/an:
    a. IgE mediated hypersensitivity reaction.
    b. IgG mediated cytotoxic hypersensitivity reaction.
    c. immune-complex mediated hypersensitivity reaction.
    d. cell mediated hypersensitivity reaction.

17. Which of the following theory explains the functions of cells (lymphocytes) in response to specific antigens invading the body?
    a. Side-Chain Theory
    b. Clonal-Selection Theory
    c. Both a) and b)
    d. None of the above

18. Chimeric antibody contains:
    a. 5-10% mouse protein.
    b. 33% mouse protein.
    c. 100% mouse protein.
    d. 100% human protein.

19. The correct statement for monoclonal antibody is:
    a. antibodies obtained from one parental cell and for one antigen.
    b. antibodies obtained from many parental cells and for many antigens.
    c. antibodies obtained from different parental cells and for one antigen.
    d. antibodies obtained from one parental cell and for many antigens.

20. Toxoid vaccine is a type of:
    a. DNA vaccines
    b. subunit vaccines
    c. recombinant vaccine
    d. conjugate vaccines

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA

[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the main Answer sheet

Course : .....

Semester : ..... **Roll No :** .....

Enrollment No : ..... **Course code :** .....

Course Title : .....

Session : 2017-18 **Date :** .....

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Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

Scrutinizer's Signature *Examiner's Signature* *Invigilator's Signature*