



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/B.TECH(BT)/SEM-5/BT-501/2011-12**

**2011**

**IMMUNOLOGY**

Time Allotted : 3 Hours

Full Marks : 70

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP - A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) ..... are responsible for the production of antibody against free pathogens and soluble products from pathogens while ..... destroy pathogen and virally infected cells and abnormal cells.
- a) Tc cells, B cells                      b) Macrophages, T cells  
c) B cells, Th cells                      d) B cells, Tc cells.
- ii) Which of the following is not a characteristic of IgG ?
- a) Its L chains are either  $\kappa$  or  $\lambda$   
b) It is the largest of all the Igs  
c) It is the predominant Ig in peritoneal fluid  
d) It crosses the placenta.



- iii) A positive skin reaction to tuberculin means that one has
- a) an active case of tuberculosis
  - b) antibodies specific for tuberculosis
  - c) memory CD4 *T* cells specific for tuberculosis
  - d) an allergy to tuberculosis.
- iv) Bacterial polysaccharide vaccines are conjugated to proteins so that
- a) the polysaccharide can act as an adjuvant
  - b) the protein can stimulate *T* cell help
  - c) the protein can act as an adjuvant
  - d) the protein makes the polysaccharide immunogenic.
- v) The lack of an immune response to self is called
- a) tolerance
  - b) negative selection
  - c) anergy
  - d) autoimmunity.
- vi) Immunoglobulin isotype is determined by the
- a) *H* chain constant region
  - b) *L* chain variable region
  - c) number of antigen-binding sites
  - d) number of *VH* domains.
- vii) Alum is an effective adjuvant because it
- a) disaggregates the antigen
  - b) slows the release of antigen
  - c) is immunogenic for *T* cells
  - d) makes a hapten immunogenic.
- viii) Lymphocytes are activated by antigen in the
- a) blood stream
  - b) lymph nodes
  - c) bone marrow
  - d) all of these.
- ix) CD antigens
- a) function as receptors for cytokine
  - b) are expressed on immune cells
  - c) allow leukocytes to recognize antigen
  - d) are found only on leukocytes.



- x) The alternative pathway of complement activation
- occurs after the classic pathway is activated
  - requires C4
  - occurs only if the classical pathway is ineffective
  - requires C3.
- xi) An immediate allergic mediator released by mast cells is
- IgE*
  - Histamine
  - Prostaglandin
  - Epinephrine.
- xii) Both Class I and Class II MHC molecules are
- expressed on the *B* cell membrane
  - composed of *a* and *b* chains
  - part of the *T* cell receptor for antigen
  - expressed constitutively on all cells.

**GROUP - B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

- What is allelic exclusion ? How does adjuvant augment the antigenicity of an antigen ? Explain the role of HLA-DM/DO interaction in the loading of peptides to MHC.  $1 + 2 + 2$
- What is the use of secondary antibody ? Cell grown in cholesterol rich medium shows better antigen presentation, explain. What do you mean by haplotype inheritance ?  $2 + 2 + 1$
- In an immunology laboratory exercise, you are studying the response of mice injected intradermally with complete antibodies to the *IgE Fc* receptor (*Fc εR1*) or with *Fab* fragments of such antibodies.
  - Predict the response expected with each type of antibody
  - Would the responses observe depend on whether the mice were allergic ? Explain. What are syngenic mice ?  $2 + 2 + 1$
- "Autoimmunity leads to the formation of immune complex in the joints leading to Rheumatoid arthritis." Explain.
- Differentiate between helper *T* cells and cytotoxic *T* cells.



**GROUP - C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. a) What do you mean by Memory cells ? 2  
b) Explain with diagram the process of Thymic Education. 5  
c) Discuss the rationale behind the use of HAT medium in hybridoma technology. 5  
d) Discuss the mode of action of Natural Killer cells. 3
8. a) Distinguish between the structural features of MHC-1 and MHC-2. 3  
b) Explain the endocytic pathway of antigen processing and presentation. 4  
c) Discuss the role of recombination signal sequences in *V-D-J* joining during somatic hypermutation. 4  
d) What do you mean by Immunogen and Hapten ? 2 + 2
9. Write short notes on any *three* of the following : 3 × 5  
a) Radio immunoassay  
b) DNA vaccine  
c) Antibody affinity and antibody avidity  
d) Class switching  
e) Immediate hypersensitivity.
10. a) Define the following : 4 × 1  
Isograft, Allograft, Xenograft, Autograft.  
b) Discuss the role of helper *T* cells in graft rejection. 5  
c) Discuss briefly the principle of HLA typing. 2  
d) Write a short account on Graft Versus Host Disease. (GVHD). 4
11. Summarize the harmful and protective sides of immediate hypersensitivity. How does allergen cause degranulation of mast cell ? What is peripheral tolerance ? What is indirect comb test ? What are the uses of polyclonal antibody ? Compare between idiotype and allotype. What is the principle of DNA vaccine ? 2 + 3 + 2 + 2 + 2 + 2 + 2

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