

[This question paper contains 5 printed pages]

Your Roll No

5810

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B.Sc. (Hons.) / III

BIOCHEMISTRY Paper XV

(Immunology)

(Admissions of 2000 and onwards)

Time 3 Hours

Maximum Marks 60

*(Write your Roll No on the top immediately
on receipt of this question paper)*

Attempt Five questions in all, including

Question No 1 which is compulsory

- 1 (A) Explain, why ? 9
- (i) Complement mediated lysis of cells is more effective if the complement is from a different species than the cells being lysed
 - (ii) Super antigens are regarded as T-cell mitogens
 - (iii) A successful (productive) heavy chain rearrangement is followed by a phase of cell proliferation before they become resting pre B cells and commence light chain rearrangement
 - (iv) Activation induced cytidine deaminase (AID) is required to fine tune B cell development and it is repressed in T cells

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- (v) Passive immunisation with anti-toxin/venom antibodies sometimes leads to serum sickness
 - (vi) Antibodies act as antigens
- (B) Indicate whether each of the following statements is *true or false*. Defend your choice (Answer very briefly) 5
- (i) Carriers are needed only if one wants to elicit a cell-mediated response
 - (ii) Infection has no influence on the rate of hematopoiesis
 - (iii) HLA-DM and HLA-DO are non-classical MHC class I molecules
 - (iv) Although monoclonal antibodies are often preferred for research and diagnostic purposes, both monoclonal and polyclonal antibodies are highly specific
 - (v) RAG-1/RAG-2 genes encode subunits of a B-lineage specific recombinase
- (C) An investigator wanted to make a rabbit antiserum specific for mouse IgG. She injected a rabbit with purified mouse IgG and obtained an antiserum that reacts strongly with mouse IgG. To her dismay, the antiserum also reacted with each of the other mouse isotypes. Explain why she got this result? How could she make the rabbit antiserum specific for mouse IgG? 2

- 2 (i) At what stage of development does a B-cell express preBcR ? How does a developing lymphocyte respond to signaling via this receptor ? 3
- (ii) For each of the following situation, indicate which type of lymphocyte would be expected to proliferate rapidly in lymph nodes and where in the node they would do so ? 4
- (a) Normal mouse with viral infection
- (b) Neonatally thymectomized mouse immunized with protein Antigen
- (iii) Describe the method of production of monoclonal antibodies developed by Milestein and Kohler 4
- 3 (i) Fever is generally beneficial to host defense Explain Name an endogenous pyrogen 3
- (ii) Name at least three types of white cells that can mediate antibody-dependent cell mediated cytotoxicity (ADCC) Explain this phenomenon by taking an example of any one of the above mentioned cells 4
- (iii) The toll receptors represent the most ancient pathways of host defense Is it justified ? Explain 4
- 4 (i) Mature dendritic cells (DC) are the most potent antigen presenting cells (APC) to naive T_H cells, why? How are they different from immature DCs found in surface epithelia and in most solid organs? 2

- (ii) Explain how are endogenous peptides for presentation generated by the cytosolic pathway 6
- (iii) Compare T_{H_1} cells and T_{H_2} cells 3
- 5 (i) What is the source and role(s) of the secretory component associated with sIgA? 2
- (ii) What are the characteristics of an Ig domain? 2
- (iii) Why is the third hyper variable region (CDR3) of Ig more variable than the other two (CDR1 and CDR2)? 2
- (iv) The complement system gives rise to inflammatory signals, opsonins and molecules that lyse the bacteria directly. Describe the general properties of each class and discuss their utility in host defense 5
- 6 (i) Enlist four factors that will promote tolerance rather than stimulation of the immune system 4
- (ii) For each pair of antigens listed below, indicate which is likely to be more immunogenic
- Explain your answer
- (a) Hen egg white lysozyme
Hen collagen
- (b) A protein with a molecular weight of 30,000
A protein with a molecular weight of 1,50,000 4
- (iii) (a) What are the advantages of sabin polio vaccine as compared with the salk vaccine?

- (b) What would be the consequence if a significant proportion of the population was not vaccinated against childhood diseases such as measles?

15 × 2 = 3

- 7 (i) Discuss how cytokines released from an activated macrophage coordinate the body's responses to infection 5
- (ii) Compare the following pairs
- (a) Antibody affinity and Antibody avidity
 - (b) Precipitation and Agglutination
 - (c) Direct and Indirect immunofluorescence 6
- 8 (i) Describe the type II hypersensitivity that occurs in an Rh⁺ infant of an Rh⁻ mother. How is it different from a type III reaction? 3
- (ii) Describe the following conditions (any four)
- (a) Systemic Lupus Erythematosus (SLE)
 - (b) X-linked hyper IgM (XHM) Syndrome
 - (c) Grave's Disease
 - (d) Rheumatoid Arthritis
 - (e) SCID
 - (f) DiGeorge Syndrome 8