

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 6385

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Your Roll No.....

Unique Paper Code : 249505

Name of the Course : B.Sc. (Hons.) Biochemistry

Name of the Paper : Immunology – I (BCHT-510)

Semester : V

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt five questions in all.
3. Question No. 1 is compulsory.

1. (a) Identify/name :

- (i) A predominant immunoglobulin class in external secretions.
- (ii) A complement component that acts as an anaphylatoxin.
- (iii) A cytokine responsible for IgG class switching.
- (iv) A nonT, nonB MHC unrestricted lymphocyte.
- (v) An immunoglobulin which is a marker for mature B cells. (5)

(b) Explain the following terms :

- (i) Haplotype
- (ii) Clonal anergy
- (iii) Transcytosis
- (iv) Allelic exclusion (4)

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- (c) Explain why ?
- (i) NK cells from a given host kill many types of virus infected cells but do not kill normal cells from the host.
  - (ii) All the T cells in the vicinity of an activated T cell (secreting IL-2) do not proliferate in response to IL-2.
  - (iii) Fewer B cells are lost during light chain rearrangement than at the stage of heavy chain rearrangement.
  - (iv) During blood transfusion MHC compatibility is not checked ?
  - (v) Nucleated cells tend to be more resistant to complement mediated lysis than red blood cells. (10)
2. (a) Differentiate between the following :
- (i) Primary and secondary immune response.
  - (ii) B-1B cells and B-2B cells.
  - (iii) Central and peripheral tolerance.
  - (iv) Hematopoietic stem cells and progenitor cells.
  - (v) Pre BCR and pre TCR. (10)
- (b) How does the Innate and adaptive immunity act in cooperative and interdependent ways to protect the host ? (2)
- (c) How will you make rabbit antiserum specific for mouse IgG ? (2)
3. (a) Discuss the mechanisms by which Antibody/TCR diversity is brought about in B and T lymphocyte ? Explain how in spite of having fewer genes, TCR exhibits enormous diversity. (5,2)
- (b) What is the arrangement of the k light-chain DNA in a B cell that has made nonproductive rearrangements of both its heavy-chain alleles and why ? (3)

- (c) What are somatic mutations ? Why do they occur ? Do they occur in TCR receptor ? Justify. (4)
4. (a) Diagrammatically illustrate various MHC molecules expressed on antigen presenting cell of a heterozygous H-2<sup>k/d</sup> mouse. (4)
- (b) What is the functional importance of MHC polymorphism ? Explain. (2)
- (c) Write the pathways by which the following antigens are processed and presented.
- (i) A UV-inactivated viral preparation that has retained its antigenic properties.
- (ii) An attenuated viral preparation that has low virulence but can still replicate within the host cells. (6)
- (d) Why dendritic cells are the most potent antigen presenting cells ? (2)
5. (a) How is complement activation an innate response ? Explain. (4)
- (b) What are the properties of an immunogen ? (2)
- (c) List the primary and secondary lymphoid organs and write their functions in the immune response. (2)
- (d) What is the effect of an immunological carrier ? (2)
- (e) How is complement system regulated ? Give the mechanism of action of three complement regulatory proteins. (4)
6. (a) What are T independent antigens ? What sort of activation response B-cells make against them ? Describe the sequence of events in B cell activation by a T dependent antigen. (3,3)
- (b) What are superantigens ? How do they influence T cell activation and T cell maturation ? (5)

- (c) What is Ig- $\alpha$ /Ig- $\beta$  heterodimer? What is its function? Describe the different stages of T cell development (3)
7. (a) Explain how cytotoxic T-lymphocytes are generated? What is the mechanism(s) used by T<sub>c</sub> cells to kill target cells? (5)
- (b) Describe the antigen independent phase of B-cell development highlighting the role of stromal cells and the characteristics of the major stages of development. (5)
- (c) What is a B cell coreceptor complex? How does it enhance B cell response? (4)
8. Write short notes on :
- (i) Natural killer cells
- (ii) Adjuvants
- (iii) Thymic education
- (iv) Mucosal dendritic cells (4,3,4,3)