

M.Sc. Sem.-3 Examination

501

Biochemistry

November-2025

Time : 2-30 Hours]

[Max. Marks : 70

Instructions:

All questions are compulsory.

Illustrate your answers with neat diagrams wherever necessary.

Question - 1**Write the following**

- i) Enlist different complement activation pathways. Explain how they differ from each other in terms of trigger, initiation, action and how they converge. [07]
- ii) Describe active neutrophils and macrophage mediated antimicrobial and cytotoxic mechanisms via different pathways [07]

OR

- i) Immune system has evolved to become more specific, complex, efficient, and regulated. Justify this statement in terms of organs and cells involved and organization of the immune system in detail. [07]
- ii) Elaborate the functions of cytokines in the complex and coordinated regulation of the immune system. Highlight their different properties. [07]

Question - 2**Write the following**

- i) Discuss how IgA differs from IgE. Compare and contrast their structure, biological function and location. Also explain the mechanism by which they mediate their effect. [07]
- ii) Explain in detail how changes in the structural characteristics of an heavy chain leads to Isotypes, Allotypes, and Idiotypes [07]

OR

- i) Which are the key inherent properties which significantly influence the immunogenicity of a molecule (the nature of the immunogen). Discuss at least three key factors in detail [07]
- ii) Explain the experiments which were pivotal in deducing the basic Y-shaped structure of immunoglobulin. Describe the fragments produced by classical enzymatic digestion, and identify the functional activity associated with each fragment. [07]

Question - 3**Write the following**

- i) Explain hybridoma technique in detail with diagram. Explain its application in various areas of immunology. [07]
- ii) Explain how different vaccines stimulates the immune system differently. Discuss at least three types of vaccines with examples. [07]

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OR

- i) Enlist and elaborate vaccine hazards with appropriate examples. [07]
- ii) What is ELISA technique? Which are the different types of ELISA and how they differ from each other? [07]

Question - 4 Write the following

- i) Discuss the factors that contribute to the susceptibility and initiation of autoimmune pathologies. Explain with examples. [07]
- ii) Describe the pathogenesis of Type II and Type III hypersensitivity reactions. Give clinical examples for each. [07]

OR

- i) Explain immunological tolerance. Discuss different mechanisms of central and peripheral tolerance in T and B lymphocytes. [07]
- ii) Define hypersensitivity. Which are different types of hypersensitivity reactions and how they differ with respect to their immunological mechanisms. Explain with suitable examples. [07]

[14]

Question - 5 Attempt any seven out of twelve.

- i) What are the key signalling molecules associated with the B-cell Receptor (BCR) that are responsible for signal transduction?
- ii Define pleiotropy and redundancy in the context of cytokine action.
- iii Give one example of a factor secreted by activated macrophages and its primary function.
- iv What is the main signalling pathway for Class I and Class II cytokine receptors?
- v Name two highly reactive chemical species generated during the macrophage oxygen-dependent killing mechanism.
- vi What are the key signalling molecules associated with the B-cell Receptor (BCR) that are responsible for signal transduction?
- vii Anaphylactic shock is a rare but dangerous. explain in context to vaccination with suitable example.
- viii Explain importance of Vaccinations during travel.
- ix Give one example each of a live attenuated and an inactivated vaccine.
- x What is the mechanism of Type I hypersensitivity?
- xi Which are the two types of grafts and how they differ in chances of rejection ?
- xii Mention two examples of Type IV hypersensitivity reactions.

