2021

MICROBIOLOGY — HONOURS

Sixth Paper

(Group-B)

Full Marks : 50

The figures in the margin indicate full marks.

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

Unit I

Answer ***any one*** question.

1. (a) What is haematopoiesis? How is steady state of haematopoiesis regulated in the system?

(b) What are the two primary characteristics that distinguish haematopoietic stem cells and progenitor cells?

(c) Why is antigen processing necessary? Describe the exogenous pathway for antigen processing.

(d) What do you understand by self-MHC restriction? Compare Ag-processing by Class I and Class II MHC molecules. Give an example of a Class III MHC molecule.

(e) What are non-professional APCs? How do these differ from professional APCs?

(f) What are adjuvants? Why are they needed?

(g) What are the contribution of memory cells in generating a faster, stronger and qualitatively better immune response than primary response? (1+2)+2+(2+3)+(2+3+1)+(2+2)+(1+2)+2

2. (a) What are the roles of stromal cells in haematopoiesis?

(b) Mention the types of cell present in the cortex region of Thymus.

(c) How do macrophages participate in innate and adaptive immunity?

(d) Distinguish between antigens and immunogens. Give examples.

(e) Name the effector cells of B and T-cell activation, respectively.

(f) What do you understand by redundancy and synergy of cytokine functions?

(g) Discuss the characteristic attributes of specific immunity.

(h) Justify— 'Plasma cells can be differentiated into memory B cells'.

(i) Show how NK cells kill target cells? Explain why normal RBCs are not killed by NK cells.

2+2+3+(2+1)+3+3+3+2+(2+2)

3. (a) What do you understand by inflammatory response? What are its cardinal signs?

(b) Give examples of mild and severe consequences of immune dysfunction.

(c) What effect does thymectomy have on a neonatal mouse and on an adult mouse? Explain why these effects differ.

(d) Justify— 'Follicular dendritic cells can process and present antigen to T–lymphocytes.'

(e) For each pair of Ag's listed below, indicate which is likely to be more immunogenic. Explain your answer:

(i) Native BSA/Heat denatured BSA.

(ii) Hen egg white lysozyme/Hen collagen.

(iii) A protein with mol. wt. 30,000 / a protein with mol. wt. of 1,50,000.

(iv) BSA in Freund's complete adjuvant/BSA in Freund's incomplete adjuvant.

(f) Where are the most polymorphic residues located in MHC molecules? What is the significance of this region? (2+2)+2+[(1½×2)+2]+2+(2×4)+(2+2)

Unit II

Answer ***any one*** question.

4. (a) What are complements? How does alternative pathway differ from classical pathway?

(b) What is an agretope? State the differences between B-cell and T-cell epitopes.

(c) What are the differences between radial and double immunodiffusion techniques?

(d) State the differences between type I and type III hypersensitivity reactions.

(e) Compare the structural features of sIg and mIg. What fragments are obtained when you treat IgG with papain?

(f) What is Ab-titer? What idea does it give about the effectiveness of the Ab in question?

(g) Discuss the characteristic features of Ig-superfamily with examples.

(h) Define immunotoxins. (1+2)+(1+2)+3+3+(2+2)+(2+2)+4+1

5. (a) How do vaccines work? What is passive immunization? When is this required? Why do some vaccines required boosters?

(b) What type of immunity is induced in attenuated and inactivated vaccines respectively?

(c) Justify— 'Babies can acquire IgE–mediated allergies by passive transfer of materal ABs.'

(d) Draw a precipitin curve and show its different regions with proper markings. What is zone of equivalence?

(e) What is DTH?

(f) What are the characteristics of myeloma cells used for monoclonal Ab production?

(g) Why all isotypes of Abs cannot activate complement?

(h) What are anaphylatoxins? (2+1+2+2)+3+2+(3+2)+2+3+2+1

6. (a) Explain the difference between Ab affinity and Ab avidity. Which of these properties better reflect its ability to contribute to humoral response generation?

(b) Differentiate between:

(i) Precipitation and agglutination

(ii) Ag and superantigens

(c) What are the biological consequences of complement activation?

(d) What are the patterns of identity, partial identity and non-identity? Explain the reasons of differences seen in these patterns with diagram.

(e) What are chimeric antibodies?

(f) Explain how the action of cytokines are regulated in the body?

(g) What immunological mechanisms most likely account for a person's development of each of the following reactions after an insect bite?

(i) Within 1-2 min after being bitten, swelling and redness appear at the site and then disappear by 1 hr.

(ii) 6-8 hr. later, swelling and redness again appear and persist for 24 hr.

(iii) 72 hr. later, the tissue becomes inflamed, followed by necrosis.

(2+2)+(2+2)+3+(3+3)+2+3+3