KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Marks Scored:

Level : B.Tech.
Year : II

23 JAN 2024

Course : BIOT 207
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date :

SECTION "A"
[20Q. × 1 = 20 marks]

Choose the most appropriate answer and mark [X] in the box.

1. _____ develops from lymphoid progenitor
   [ ] Megakaryocyte
   [ ] Erythrocyte
   [ ] Natural killer cell
   [ ] Basophil

2. Class II antigens are:
   [ ] Primarily derived from extracellular proteins
   [ ] Proteins degraded in the proteosome
   [ ] Transported into the endoplasmic reticulum in an ATP-independent manner
   [ ] Recognized by cytotoxic T cells

3. Receptor editing in B cells occurs due to:
   [ ] Failure of recognition of self MHC
   [ ] Somatic hypermutation
   [ ] Recognition of a cell surface self-antigen
   [ ] Induction of clonal anergy

4. T_H2 effector cells can typically:
   [ ] Promote clearance of a viral infection.
   [ ] Promote the secretion of IgG1 antibodies.
   [ ] Activate macrophage.
   [ ] Take up extracellular antigens through micropinocytosis.

5. Which of the following statements regarding complement activation is FALSE?
   [ ] Can promote uptake and removal of microorganisms by phagocytes.
   [ ] Can facilitate the clearance of immune complexes.
   [ ] Can lyse cells.
   [ ] Can be initiated by the binding of C1q to IgM molecules present in serum.

6. Which of the following statements regarding CTLA-4 is FALSE?
   [ ] Its expression is upregulated on activated T cells.
   [ ] It is constitutively expressed on T cells.
   [ ] It has a 20 times higher affinity for B7 ligands than CD28.
   [ ] CTLA-4 deficient mice die of a massive lymphoproliferative disorder.

7. The classical and alternative pathways meet at complement component:
[ ] C3 [ ] C4 [ ] C4b [ ] C5

8. When a resting naive T-cell engages its specific MHC/peptide complex displayed on the surface of a cell it _____.
[ ] produces IL-2 [ ] proliferates [ ] becomes anergic [ ] secretes IL-1

9. T-cell help for antibody production:
[ ] Depends on recognition of native antigen bound to B-cell surface immunoglobulin
[ ] Depends on recognition of antigen processed by the B-cell
[ ] Involves class I MHC on the B-cell.
[ ] Can occur in mice with nude mutation

10. B-cells are different from T-cells as they _____.
[ ] Bear surface immunoglobulin receptors for antigen
[ ] Bear surface CD3 molecules
[ ] Are lymphocytes
[ ] Can be activated by stimulation through the antigen receptor alone

Fill in the blanks

11. The T-cell ligand binding B7 on a professional antigen-presenting cell is _____

12. Prior to class switching, B-cells express immunoglobulin _____.

13. _____ granulocyte is not a phagocyte.

14. "Fab" in antibody stands for _____.

15. MHC I is expressed by _____ cells.

Define the following

16. Co stimulatory signals:

17. Central lymphoid organ:

18. Memory cells:

19. Clonal deletion:

20. Thymus dependent antigens:

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F.M. : 55

SECTION "B"
[7Q × 5 =35 marks]

Attempt *ALL* questions.

1. Explain the significance of TAP molecules in MHC I pathway.
2. Discuss the role of antigen presenting cells in adaptive immune response.
3. Write short note on humoral immunity.
4. Discuss different steps involved in the development of single positive thymocytes.
5. Discuss how the concept of "linked recognition" have been used in vaccine development.
6. Discuss immunoglobulin class switching highlighting on its significance in humans.
7. Compare and contrast the structure, expression and functions of MHC I and MHC II.

SECTION "C"

8. Give TWO differences between *ANY FIVE* [5Q × 2 = 10 marks]
   a. Naïve lymphocytes and Effector lymphocytes
   b. Receptor editing and Affinity maturation
   c. IgG and IgM
   d. Helper T cell and Cytotoxic T cell.
   e. Conventional antigen and Superantigen.
   f. Opsonization and Antibody dependent cell cytotoxicity.

9. Explain WHY/HOW for *ANY FIVE* [5Q. × 2 = 10 marks]
   a. The classical complement pathway plays a role in both innate and adaptive immunity.
   b. Not all B cells leaving the bone marrow survive.
   c. Phagocytosis is an innate immune response.
   d. Somatic hypermutation can generate antibody diversity.
   e. Negative selection of lymphocytes prevents autoimmunity.
   f. Vaccine induces protection against pathogens.