KATHMANDU UNIVERSITY
End Semester Examination
August/September 2017

Mark Scored :

Level : B. Tech.
Year : II

Course : BIOT 207
Semester : II

Exam. Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : SEP 0 7 2 17

SECTION "A"
[10 Q. × 1 = 10 marks]

Choose the appropriate answer.

1. Cancer cells often have reduced amounts of cell surface proteins, including class I MHC antigens. Which of the following cells of the immune system can exploit this property to kill cancer cells?
   [ ] Cytotoxic T cells
   [ ] Natural Killer cells
   [ ] Helper T cells
   [ ] Macrophages

2. Which of the following is NOT a feature of a secondary immune response to an antigen, when compared to the first response to the same antigen?
   [ ] The antibody is generated faster
   [ ] More antibodies are produced
   [ ] The antibody produced has higher affinity for antigen
   [ ] Antibody is generated without T-cell help

3. Humoral immunity can be boosted using:
   [ ] monoclonal antibody technology
   [ ] treatment with interferon
   [ ] treatment with interleukin-2
   [ ] treatment with tumor necrosis factor

4. Proliferation of activated T-cells:
   [ ] Is stimulated by a single signal induced by engagement of the T-cell receptor.
   [ ] Requires both the signal described in A plus co-stimulation from B7.
   [ ] Requires both the 2 signals described in B plus interaction between LFA-1 and ICAM-1.
   [ ] Requires only mutual binding of LFA-3 and CD2 on the antigen-presenting cell and T-cell respectively.

5. T-cell help for antibody production:
   [ ] Depends on T-cell recognition of native antigen bound to B-cell surface Ig
   [ ] Depends on T-cell recognition of antigen processed by the B-cell
   [ ] Involves class I MHC on the B-cell.
   [ ] Can occur in X-irradiated mice.

6. The specificity of antibody secreted by a B-cell may not be the same as that of the surface Ig of the clonal parent because of:
   [ ] isotype switching
   [ ] somatic hypermutation
   [ ] alternative splicing
   [ ] different heavy and light chain pairing

7. The classical pathway is activated by a combination of:
   [ ] bacteria, antigen and antibody
   [ ] complement, antigen and antibody
   [ ] antigen and antibody
   [ ] virus, antigen and antibody

8. What are the first cells that recognize a processed and presented T-dependent antigen?
[ ] B lymphocytes [ ] Memory cells [ ] Macrophages [ ] T helper cells

9. Which of the following is not an assumption which can be derived from the clonal selection theory?
[ ] Determined cells have begun to differentiate, but are not fully differentiated.
[ ] Each genetically different type of lymphocyte expresses a single specificity.
[ ] Any lymphocyte that could possibly mount a harmful response against self molecules is eliminated or suppressed
[ ] Development of both T and B and T lymphocytes follow a similar pattern

10. All the following are characteristics of both MHC class I and class II molecules *except*:
[ ] They are expressed codominantly.
[ ] They are expressed constitutively on all nucleated cells.
[ ] They are glycosylated polypeptides with domain structure.
[ ] They are involved in presentation of antigen fragments to T cells.

SECTION "B"

[5 Q × 1 = 5 marks]

Fill in the blanks:

11. The ratio of T cells to B cells is _____.

12. The immunoglobulin class which is the least abundant in normal adult is _____.

13. _____ selection of thymocytes is necessary to produce a T-cell repertoire capable of interacting with self-MHC molecules.

14. Body's own cells are protected from membrane attack complex by surface glycoprotein called _____.

15. The specificity of an antibody is due to _____.

SECTION "C"

[5 Q × 1 = 5 marks]

Define the following:

16. $F(ab')_2$ fragment of antibody:

17. Discontinuous epitope:

18. Anergic B cells:

19. Linked recognition:

20. Granzymes:

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SECTION "D"
[7Q × 5 = 35 marks]

Attempt *ALL* questions.

1. A person receives a live attenuated vaccine for a certain disease. Discuss the antigen processing and presentation pathway that follows to develop immunity to that pathogen.

2. The innate immune system uses two different strategies to identify pathogens: recognition of non-self and recognition of self. Give examples of each and discuss how each example contributes to the ability of the organism to protect itself from infection.

3. Enlist the four main processes that generate the diversity in the lymphocyte repertoire and elaborate on somatic hypermutation.

4. Discuss the process through which double negative thymocytes develop into single positive thymocytes.

5. Elaborate on the role of antigen presenting cells in clonal expansion and differentiation of naïve T cells.

6. Discuss how positive and negative selection of thymocytes co-ordinate with each other for survival of T lymphocytes.

7. Discuss the role of inflammatory barrier in immunity

SECTION "E"
[5Q × 2 = 10 marks]

8. Give *TWO* major differences between (*ANY FIVE)*

   a. Cell mediated and Humoral Immunity
   b. Isotype switch and Receptor editing
   c. Structure of MHCI and MHCII
   d. Armed effector lymphocytes and Naïve lymphocytes
   e. Thymus dependent and Thymus independent antigens
   f. Dendritic cells and Macrophages

SECTION "F"

[5Q × 2 = 10 marks]

9. Explain WHY/HOW for *ANY FIVE* questions.

a. Antibodies, which all have the same basic shape, recognize antigens of a wide variety of different shapes

b. B cell receptor and T cell receptor are similar in many aspects.

c. In the absence of Invariant chain (Ii), many MHC class II molecules are retained in the endoplasmic reticulum as complexes with misfolded proteins.

d. Spontaneous hydrolysis of the thioester bond in C3 occurs at a continuous low rate even in the absence of infection. However this does not cause damage to normal host cells.

e. Complement 3 deficiency is more serious clinically than complement 1 deficiency

f. Some microorganisms produce enzymes that can degrade the F_c portion of antibody molecules and this is advantageous for their survival.