Register Number:……..

KUMARAGURU college of technology
character is life

B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Sixth Semester

BIOTECHNOLOGY

U18BTI6203: Immunology

COURSE OUTCOMES

CO1: Comprehend the general concepts of immune system and elaborate the cells and organs of the immune system.

CO2: Analyse and evaluate the properties of antigens and antibodies with special emphasis on haptens.

CO3: Demonstrate and evaluate various antigen-antibody interactions and techniques.

CO4: Apply the concept of cell mediated immunity and complement system.

CO5: Illustrate the mechanisms behind hypersensitivity and autoimmunity mechanisms.

CO6: Imbibe the concept of transplantation and cancer immunology

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the following immune cells with their functions: CO1 [K_1]

List I	List II
A. Macrophages	i. Allergic reactions
B. Eosinophils	ii. Antigen processing and presentation
C. Basophils	iii. Phagocytosis
D. Dendritic cells	iv. Parasitic infections

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	i	ii
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. Which of the following cells may eventually differentiate into an immunoglobulin bearing memory cell? CO1 [K_2]

a) Naïve B cell b) Hematopoietic cell

c) Memory cell d) Naïve T cell

3. Indicate which of the following statements regarding haptens and carriers are true. CO2 [K_4]

1. Haptens are small organic molecules which are not immunogenic by themselves.
2. When a hapten-carrier complex containing multiple hapten molecules is injected into an animal, most of the induced antibodies are specific for the hapten.
3. Carriers are needed only if one wants to elicit a cell-mediated response.
4. It is necessary to immunize with a hapten-carrier complex in order to obtain antibodies directed against the hapten.

a) 1,3 b) 1,4

c) 1,2 d) 2,3

4. Papain digestion of an IgG preparation of antibody specific for the antigen hen egg albumin (HEL) will CO2 [K_2]

a) lose its antigen specificity b) precipitate with HEL

c) lose all interchain disulfide bonds d) produce two FAB molecules and one Fc fragment

5. **Assertion (A):** Production of C3b is a major amplification step of the complement pathway. CO4 [K_4]
Reason (R): A single C3 convertase molecule can generate over 200 molecules of C3b

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A

c) A is true but R is false d) A is false but R is true

6. Which of the following does *not* participate in the formation of antigen-antibody complexes? CO3 [K_2]

a) Hydrophobic bonds b) Covalent bonds

c) Electrostatic interactions d) Hydrogen bonds

7. Predict the correct sequence of events in the mast cell degranulation of Type I hypersensitivity. CO5 [K_4]

1. Phosphorylation of tyrosines within ITAM receptors
2. Increase in membrane fluidity and release of Ca^{2+} from intracellular stores.
3. Cross linkage of Fc€RI receptors
4. Movement of granules to the PM followed by degranulation.
5. Assembly of microtubules and contraction of microfilaments

a) 2-3-1-5-4 b) 3-1-2-5-4

c) 3-2-1-5-4 d) 1-3-2-5-4

8. Immunotoxins are — CO6 [K_2]

a) toxic substances released by macrophages
b) cytokines
c) toxins completed with the corresponding antitoxins
d) toxins coupled to antigen-specific immunoglobulins

9. Grafts between genetically identical individuals (i.e., identical twins) — CO6 [K_2]

a) are rejected slowly as a result of minor histocompatibility antigens
b) are subject to hyperacute rejection
c) are not rejected, even without immunosuppression
d) are not rejected if a kidney is grafted, but skin grafts are rejected

10. Autoimmune diseases are caused by — CO5 [K_1]

a) a defect in the cell-mediated immune system
b) a defect in thymus development
c) an immune response against self-antigens
d) T cell deficiency

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11.	List the major functions of thymus and bone marrow.	CO1	[K_1]
12.	Mention any two growth factors involved in hematopoiesis and give their significance.	CO1	[K_2]
13.	What are the effects exerted by adjuvants on immune response?	CO2	[K_2]
14.	Infer the significance of B cell receptor.	CO2	[K_3]
15.	Differentiate affinity from avidity with a suitable example.	CO3	[K_4]
16.	Give the principle behind HAT selection during the production of monoclonal antibodies.	CO3	[K_2]
17.	What is ADCC? Which cell contributes to this mechanism?	CO4	[K_2]
18.	How do lectin pathway of complement activation is similar to classical and alternate pathway?	CO4	[K_4]
19.	What is contact dermatitis? Mention the agents that bring about it.	CO5	[K_2]
20.	What types of grafts are involved in transplantation?	CO6	[K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 350 words)

21.	a)	Describe in detail the structure and functions of primary lymphoid organs.	10	CO1	[K_2]
	b)	Differentiate innate immunity from adaptive immunity with an example.	4	CO1	[K_4]
22.	a)	Elucidate the fine structure of immunoglobulin with a neat sketch.	8	CO2	[K_2]
	b)	Predict the mechanism of T-dependent and T-independent antigens.	6	CO2	[K_3]
23.	a)	Enumerate the types and applications of ELISA technique.	7	CO3	[K_3]
	b)	Describe the technique of hybridoma technology and applications of monoclonal antibodies.	7	CO3	[K_3]
24.	a)	Elaborate the cell mediate immune mechanisms mediated by CTL and NK cells.	7	CO4	[K_2]
	b)	Discuss the cascade of complement activation by the classical pathway.	7	CO4	[K_2]
25.	a)	Give an account on the mechanisms of Type I hypersensitivity reactions.	8	CO5	[K_2]
	b)	Compare and contrast systemic and organ-specific autoimmune disorder with an example.	6	CO5	[K_4]
26.	a)	Comment on the immunological basis of graft rejection. Add a note on immunosuppressive therapy.	8	CO6	[K_2]
	b)	How does the immune system respond to tumors?	6	CO6	[K_2]

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