JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2025

M.Sc –II Semester (BT)

Course Code (Credits): 20MS1BT212 (3) Max. Marks: 25

Course Name: Immunology

Course Instructors: Dr.Abhishek Max. Time: 1.5 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

<table>
<tr><th>Q.N</th><th>Question</th><th>Marks</th></tr>
<tr><td>Q1</td><td>You would like to generate antibodies against a specific antigen, antigen A, derived from a mammalian virus. You inject a rabbit with antigen A to hopefully elicit antibodies, and you assay antigen A specific antibody levels in rabbit blood every seven days. On day 28 you inject the same rabbit with more antigen A and measure antibody response for the next four weeks.
The results of your measurements are shown below. As a necessary control, you tested the blood of this rabbit prior to any injections (0 time point).
<table>
<tr><th>Day after Injection</th><th>Presence of antibody against antigen A</th></tr>
<tr><td>Before injection 0</td><td>-</td></tr>
<tr><td>7</td><td>++</td></tr>
<tr><td>14</td><td>++</td></tr>
<tr><td>21</td><td>+</td></tr>
<tr><td>28</td><td>+</td></tr>
<tr><td>35</td><td>++++++++</td></tr>
<tr><td>42</td><td>+++++++</td></tr>
<tr><td>49</td><td>++++++</td></tr>
</table>
a. Why is the antibody response low on day 28 and high after day 35?
b. Antibodies to antigen A were detected on day 0 (prior to injection of antigen A) in a second rabbit in this study. How could this be explained?
c. Suppose on day 28 the rabbit was injected with both antigen A and a different antigen, antigen B.
I. Would you expect the levels of antibody against antigen B on day 35 to be higher, lower, or the same as the levels of antibodies against antigen A?
II. Draw a graph indicating the levels of antibodies to antigens A and B vs. time.</td><td>2+2+2+2</td></tr>
<tr><td>Q2</td><td>Answer the following question
a. Why the route of antigen administration significantly impacts the immunological response, you may use antigen administered through intravenously and subcutaneously as an example.
b. What do you understand by sequential, non-sequential epitope and hapten, explain with suitable example? List-out the importance of sequential, non-</td><td>2+3+3</td></tr>
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	sequential epitope and hapten in the generation of immuneresponse? c. For each pair of immunogen listed below, indicate which is likely to be more immunogenic and why? Explain your answer. I. Native GP120 protein Heat-denatured GP120 protein II. Haemoglobin in Freund's complete adjuvant Haemoglobin in Freund's incomplete adjuvant	
Q3	You prepare an immunotoxin by conjugating *Ricin* toxin with a monoclonal antibody specific for a tumor antigen. I. If this immunotoxin is injected into an animal, will any normal cells be killed or not? Explain. II. If the antibody part of the immunotoxin is degraded so that the toxin is released, will normal cells be killed or not? Explain. III. Illustrate the working mechanism of immunotoxin (using neat and clean diagram) using ricin as a toxin component.	2+2+2
Q4	a. What are CDR regions? Where the CDR regions located and what are their functions? b. Describe one of the important roles played by Fc receptors.	2+1