

Birla Institute of Technology & Science, Pilani

Comprehensive Examinations

Second Semester (2023-24)

Molecular Immunology (BIO G 514)

Closed Book | Marks: 15 | Time: 1 Hour

- 1) What is the function of the white pulp in the spleen? Describe the anatomical features of the same. **(2)**

- 2) Write short notes on
 - i) FRC Conduits
 - ii) Innate Lymphoid cells **(2)**

- 3) At which stage of B cell maturation does isotype switching and affinity maturation occur. Justify your answer. **(3)**

- 4) Detail the major categories of signaling receptors in the immune system. **(4)**

- 5) What is the role of the co-receptors in T cell signaling. **(4)**

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Closed Book | Marks: 25 | Time: 2 Hours

- 1) You were given two antibody preparations. You were asked to classify the epitopes of an antigen based on experimentation with these two preparations. How would you proceed and what would be your possible inferences? (Hint: The antigen is a protein and can be subjected to different treatments)

- 2) In an experimental system, when LAT has been mutated, some activation of T cells still happens. However, when ZAP 70 is mutated activation is rarely seen. Explain these possible observations.

- 3) What could happen if C3 convertase were blocked with a small molecule inhibitor?

- 4) You had been asked to perform a gene knockout experiment and had inadvertently deleted the gene coding for the invariant light chain. What could be the possible phenotypic expression in such an animal? Why?

- 5) Why can a murine monoclonal antibody give rise to a harmful reaction if introduced into a human for therapeutic purposes? What is one possible way to overcome this effect?

- 6) In a B cell the RSS sequences are separated by 8 bp and 26 bp spacers. Would such a cell survive to maturity? Explain with reasons.

- 7) In a CRISPR–cas mediated gene editing experiment you had accidentally knocked out the gene for Ape 1 endonuclease. What could be the possible immunological effects?

- 8) You have created a molecule which inhibits formation of the immunological synapse. What could be the negative effects of such a molecule. Justify your answer. (4)