BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI, PILANI CAMPUS
COMPREHENSIVE EXAMINATION: I SEMESTER: 2022-23
ANIMAL CELL TECHNOLOGY
CLOSED BOOK

Maximum Marks: 30 CB +40 OB
Maximum Time: 120min **Date: 26/12/2022**

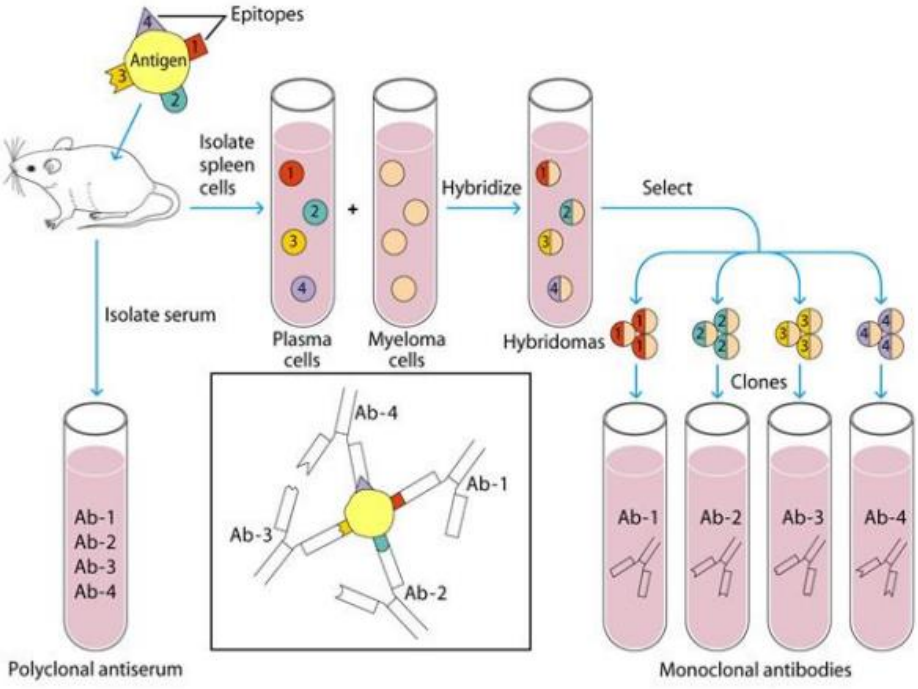
NOTE: Kindly note that the time available is 2h. Collect open book after submitting closed book, spending not more than 1h 15min in closed book. Please answer questions of each section together.

Part A (15M)

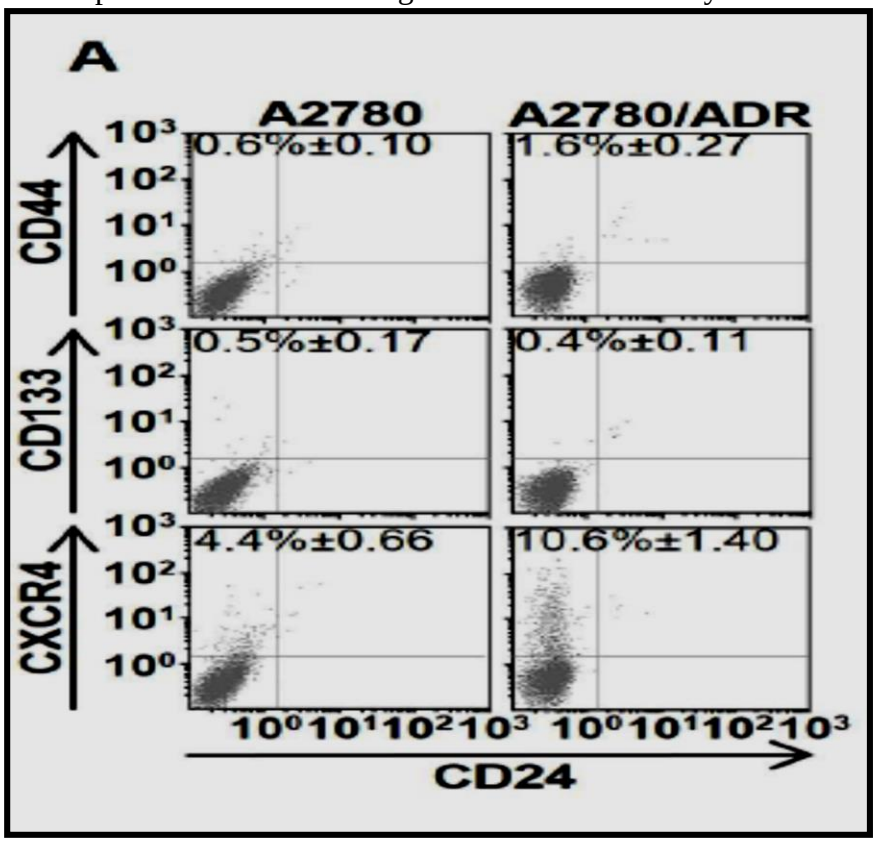
Q1. As a research scholar you have been given a task of creating a lymphoblastoid cell line. So you went ahead with infecting primary human B cells with EBV. But still after few passages you found out that the cells are dying. Troubleshoot your experiment with justification? [3M]

Q2. What are the different types of cellular junctions that we need to disintegrate during primary culture of epithelial cells? Please suggest the different enzyme combinations possible to disintegrate these intracellular junctions? [3M]

Q3. Please refer to the figure given below and explain how can you produce monoclonal antibodies through Hybridoma Technique? [4M]



Q4. The following flow cytometry histogram analysis shows profile of different genetic markers in A2780 compared to the resistant cell type- A2780/ADR. A) What can you conclude from the given figure with respect to the markers? B) Can you enumerate <u>schematically</u> the probable experimental procedure followed for generation of the flow cytometric data. What would you use as a positive control for the experiment performed?



[2+3=5M]

Part B

Q5. What is zymography. How can it be used for cell characterization? Give 1 example. (4)

Q6. Which normal cells are an exception to senescence. Can you suggest a possible reason for it. (3)

Q7. Differentiate between a batch culture and continuous culture (in a tabular form) when scaling up cells. Also give an example of each. (4)

Q8. Which agency monitors radiation use in our country. What are the precautions to be taken while working with radioactivity? (4)

GOOD LUCK

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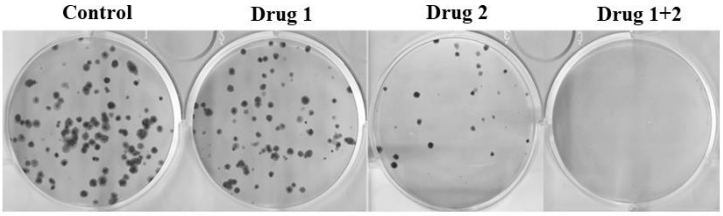
PART A (20M)

Q1. In the figure below, a cologenic assay with MCF7 tumor cells were performed upon treatment with two drugs and their combination. Different number of colonies were observed in all of these set. Drug 1 blocks PI3K-Akt signaling while Drug 2 blocks Src-PLC gamma signaling and the dosage of the drug used such that they will completely block the respective signaling in the cells. Based on these information, what can you interpret of the data? Write the interpretation as if you are writing it for the result section of a manuscript? [4M]



Q2. If you have to construct a retroviral vector for Gene Y so that it can be easily transferred iPSCs that will be used for treatment purposes, how will you design and assemble such construct? Explain with a flow chart. [4M]

Q3. You wish to generate endothelial specific KLF2 knock out mice to study its effect on developmental angiogenesis. From the knowledge gain in the course describe with a flow diagram, how will you generate so. Also use names to define the genotypic character of the mice. Ve-Cad is considered as endothelial specific promoter. Please give details of the crosses that you will perform to achieve your goal. If you have to generate **inducible** KLF2 knock-out mice, what approach will you take to do so? Be specific and concise in your answer. [6+2=8M]

Q4. Your friend is a researcher working in the area of iPSC and its capability of generating organs. To this line, she decided to validate that if rat derived iPSC can contribute towards the development of mice organs. To do so, she has decided to perform the conventional technique that she has previously used in the lab. However, she was unable to come up with an easy and most appropriate solution to observe the incorporation of rat derived iPSC in mice organs. As a good friend, you have decided to help her. With the knowledge gain in the course, what will you suggest your friend to do to easily resolve any such difficulties? Explain in brief the technique she may employ to easily resolve this problem. [4M]

PART B

Q5. How can you use glutamyl synthetase for characterizing astoglial cells. Draw a flow diagram to represent the same. (4)

Q6. Given below is a schematic diagram for forensic analysis using DNA sample derived from blood. How can a similar procedure also be used for forensic studies using proteins isolated from the blood of potential suspects. Draw a schematic flow diagram representation of the same.(4)

Q7. Suppose you are given a tissue sample containing liver stem cells. What growth conditions should be followed by you to be able to obtain a terminally differentiated hepatocyte from it.(4)

Q7. How can automation be used for scaling up cell culture. (4)

Q8. Suppose you are involved in the following studied involving corona virus. What biosafety precautions must you take? (4)

(i) Screening for prevalence from population
(ii) Sequencing for new variant from already isolated DNA

END