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Candidate's Seat No :_____

M.Sc. Sem.-1 Examination

404

Life Science

January-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions: Illustrate your answers with neat diagrams wherever necessary.

Q. 1 Write the following

(i) Define stem cells and describe the classification of stem cells based on origin (7 Marks)

(ii) Explain various types of adult stem cells and its sources (7 Marks)

OR

(i) What are stem cells and describe various types of stem cells based on potency (7 Marks)

(ii) Describe Embryonic stem cells and its sources (7 Marks)

Q.2 Write the following

(i) Explain various application of adult stem cells (7 Marks)

(ii) Explain the difference between embryonic and adult stem cells . Describe various research applications of embryonic stem cells (7 Marks)

OR

(i) Define stem cell markers. Give examples of stem cell markers for HSC, MSC, Neuronal and Hepatic. What are the techniques for identification of stem cell markers (7 Marks)

(ii) Define iPSC. Explain the process of generation of iPSC from somatic cells. (7 Marks)

Q. 3 Write the following

(i) Explain in detail with diagram the process of isolation of hematopoietic stem cells (HSC) from umbilical cord blood (7 Marks)

(ii) Explain in detail the various immunological techniques for characterization of stem cells (7 Marks)

OR

(i) Describe the various microscopy based characterization of stem cells (7 Marks)

(ii) Explain in detail with diagram the process of isolation of mesenchymal stem cells(MSC) from Adipose tissue derive stem cells (7 Marks)

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Q. 4 Write the following

(i) Describe various therapeutic applications of HSCs (7 Marks)

(ii) Describe the step wise process of cryopreservation of stem cells (7 Marks)

OR

(i) Describe various therapeutic applications of MSCs (7 Marks)

(ii) Define the characteristics of cryoprotectant and describe various types of cryoprotectants (7 Marks)

Q. 5 Attempt any seven out of twelve (14Marks)

(i) Name the two key characteristics of stem cells

(ii) Define iPSCs and name of discoverers

(iii) Define ICM and who gave the term embryonic stem cells

(iv) Provide two sources for HSC and name of discoverer

(v) Name the four factors responsible for generation of iPSC

(vi) Give examples of two HSC markers

(vii) Give examples of two MSC markers

(viii) Differentiate Autologous & Allogenic stem cell transplant

(ix) Give examples of two permeating cryoprotectant

(x) Give examples of two non-permeating cryoprotectant

(xi) In control rate freezing the rate of cooling is _____ °C/min

(xii) Name four transcription factors for generation of iPSC