STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI –600 086
(For candidates admitted during the academic year 2023 – 2024 & thereafter)

M. Sc. DEGREE EXAMINATION, APRIL 2026
BIOTECHNOLOGY
FOURTH SEMESTER

COURSE : CORE
PAPER : STEM CELL AND TISSUE ENGINEERING
SUBJECT CODE : 23BY/PC/ST44
TIME : 3 HOURS MAX. MARKS: 100

Q. No.	SECTION A Answer ALL Questions (10 x 1 = 10 marks)	CO	KL
1	_____ refers to the varying ability of stem cells to differentiate into specialized cell types.	1	1
2	The biomaterials are expected to mimic the functions of _____	1	1
3	_____ is the first process involved in biomaterial-tissue interaction.	1	1
4	_____ is a transcription factor essential in order to maintain the pluripotency of induced pluripotent stem cells.	1	1
5	Why are perfusion bioreactors preferred over rotating wall vessel bioreactors for bio-artificial liver production?	1	1
6	What is the primary purpose of using growth factors in tissue engineering?	1	1
7	Which type of cell is commonly used for generating pancreatic islets in tissue engineering	1	1
8	The process of maintaining a whole embryo or organ in an artificial medium is known as_____	1	1
9	_____tissue engineering involves facilitating the self-repair of tissues through mechanisms like gene therapy	1	1
10	What is the "Rule of Nines" primarily used to estimate?	1	1
Q. No.	**SECTION B Answer ALL Questions (5 x 2 = 10 marks)**	**CO**	**KL**
11	Outline MAPK.	1	2
12	Interpret the role of stem cell niche.	1	2
13	What are β-cells and what is their role in diabetes?	1	2
14	Explain demyelination, and how does it affect nerve conduction in MS?	1	2
15	Classify types of HBOC's.	1	2
Q. No.	**SECTION C Answer ALL Questions (4 x 10 = 40 marks)**	**CO**	**KL**
16	Analyze the steps in establishing stem cell banking. **(OR)** Categorize the types of stem cell products in the market.	2	3
17	Infer the importance of different types of stem cell regulators. **(OR)** Analyze the designing of bio-artificial pancreas with a neat diagram	2	3

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18	Compare and contrast different models used in tissue engineering **(OR)** Analyze and comment on any 2 types of bioreactors with a neat diagram.	3	4
19	Examine the role of different biomaterials is tissue engineering **(OR)** Explain Wnt pathway in detail.	3	4
Q. No.	**SECTION D** **Answer ALL Questions (2 x 20 = 40 marks)**	**CO**	**KL**
20	Critically evaluate the process isolation, characterization and scale up of stem cells **(OR)** Explain the role of stem cell therapy in Parkinson's Disease	4	5
21	Compile the use of 3D bioprinting in tissue engineering **(OR)** Elaborate on the steps involved in artificial womb and its applications	5	6

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