Question Paper

Exam Date & Time: 15-Jan-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

VII SEMESTER B.TECH END SEMESTER MAKE UP EXAMINATIONS, JAN 2024

Tissue Engineering [BME 4071]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		Justify the roles of polycomb group proteins and G1 phase regulators for regulating the self-renewal of mesenchymal stem cells.	(3)
	A)		
	B)	Evaluate the steps involved in the isolation of mouse ES cells also analyse how to assess the potency of the isolated ES cell in vitro.	(5)
	C)	What is epigenetic mechanism? Does chromatin compaction have any influence on gene transcription?	(2)
2)		Differentiate among de-differentiation, re-differentiation and transdifferentiation.	(3)
	A)		
	B)	Analyze the steps associated with autologous chondrocyte implantation.	(3)
	C)	Sameer has got SEM images of gelatin based scaffolds. He wishes to assess the porosity. Analyze how he would proceed to have quantitative assessment of the pores.	(4)
3)		Highlight the criteria for scaffolds for cartilage tissue engineering.	(5)
	A)		
	B)	Analyze the significance of shear stress in angiogenesis.	(2)
	C)	Chitosan is a biopolymer extracted from waste materials (exoskeleton of prawn). How would you use chitosan to fabricate interconnected porous scaffolds? Write down your strategies in a brief and logical manner.	(3)
4)		Sayoni was asked to make fibers and porous scaffolds. Explain the methods she would choose. Justify.	(3)
	A)		
	B)	'The surface of the polystyrene plate (tissue culture plate) was made rough and contact angle was reduced.' justify your views.	(2)
	C)	Sourasish had harvested chondrocyte, hepatocyte and osteocytes from a human subject (primary culture). How would he: (i) Select specifically chondrocyte from the heterogenous population.	(5)

(ii) Comment on whether FACS study could be appropriate for selecting the above cells. After selection, how would he maintain and preserve these cells? In this context, analyze the roles of dimethyl sulfoxide and polyethylene glycol for cell preservation.

5) Explain your strategies to induce differentiation during cell culture. Justify . (3)

A)

B) Compare different types of culture media. (3)

C) Explain the purpose of using the following components in culture medium- (i) Phenol red, (ii) sodium bicarbonate, (iii) serum, (iv) antibiotics. (4)

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