Question Paper

Exam Date & Time: 17-Nov-2022 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

MANIPAL INSTITUTE OF TECHNOLOGY
SEVEN SEMESTER B.TECH END SEMESTER EXAMINATIONS, NOV 2022

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)		Analyse IL1 driven process in skin cell signalling and illustrate the specific role of each component.	(4)
	A)		
	B)	Compare 'symmetric' and 'asymmetric' stem cells divisions. Discuss factors regulating asymmetric stem cell division.	(3)
	C)	You have harvested chondrocyte and osteocytes from a human subject for their application in cartilage tissue engineering. How would you (i) select specifically chondrocyte from the heterogeneous population, (ii) convert them to cell line. Justify your strategy logically.	(3)
2)		What makes fiber connective tissue a dense connective tissue? Explain with reason for the difference in strength between regular and irregular dense connective tissues.	(2)
	A)		
	B)	Clearly state the role of chromatin compaction in regulating transcription for stem cells? Differentiate the stages of isolation of mouse embryonic stem cells and human embryonic stem cells.	(5)
	C)	Analyse the steps involved in "Autologous Chondrocyte Transplantation" process.	(3)
3)		A person met an accident and the femur bone got fragmented. In this context, analyse the mechanism of bone formation that would proceed for the repair of the broken segment of femur bone. Explain the significance of alkaline phosphatase (ALP) in osteoid calcification.	(4)
	A)		
	B)	Differentiate endochondral or intramembranous mechanisms.	(3)
	C)	Compare vasculogenesis and angiogenesis. How does anti-VEGF therapy work?	(3)
4)		Compare different types of stem cell niche.	(2)
	A)		
	B)	Surface of chitosan (biopolymer) is modified which leads to reduction of the contact angle from 70 degrees to 30 degrees. Evaluate the impact of the change in contact angle on cellular behaviour.	(4)
	C)	Illustrate some essential properties that scaffolds should possess for tissue engineering application.	(4)
5)		Measurement of porosity is an important aspect of characterizing scaffolds. Compare and analyse	(3)

A) the different techniques used in determining porosity.

B) Differentiate 'poro-gen leaching' and 'freeze drying' (lyophilisation) techniques. Both the processes fail to make homogeneous interconnected pores. Propose a method to overcome these limitations. (3)

C) A researcher has designed a scaffold using a synthetic polymer. The surface of the scaffold is not intrinsically recognized by cell receptors. Propose a strategy to improve cell-material interaction by modulating protein adsorption on the scaffold surface. (4)

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