Question Paper

Exam Date & Time: 27-Dec-2022 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH MAKE-UP EXAMINATIONS DEC./JAN. 2023

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 the role BMP in bone cell signalling (Illustrate the specific role of each component).	(3)
	A)		
	B)	Compare 'de-differentiation' and 're-differentiation'. Illustrate in vivo assessment of embryonic and hematopoietic stem cells.	(4)
	C)	Differentiate the process involved in rate zonal and isopycnic gradient centrifugation process. Why is FACs not considered an ideal process of selection when isolated cells are meant for clinical application? Justify your views logically.	(3)
2)		Explain the strategies you would adopt to sterilize the following items:	(2)
	A)	(i) sharp instruments, (ii) hospital bed mattress, (iii) culture medium, (iv) radiation sensitive biopolymer.	
	B)	How do you make feeder cell layer? Analyse the stages of isolation of mouse embryonic stem cells and justify the use of feeder cell layers during isolation process.	(5)
	C)	Discuss the major components of cartilage, and analyse why cartilage has limited capacity to get repaired.	(3)
3)		Illustrate briefly, the role of various transcription factors pertaining to the LIF-STAT pathways.	(4)
	A)		
	B)	Analyze how shear stress regulate blood vessel formation.	(3)
	C)	Analyse the steps involved in angiogenesis (formation of new blood vessels). State the role of VEGF and hypoxia in the mentioned process.	(3)
4)		What is Hay Flick Limit? Analyze how does this influence embryonic and adult stem cells?	(2)
	A)		
	B)	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.	(4)
	C)	Illustrate some essential properties that scaffolds should possess for cartilage tissue engineering	(4)

application.

5) What is "porogen"? How does it help in making porous scaffold? Explain. (3)

A)

B) You are asked to make fibers and porous scaffolds. Explain the methods you would choose. Justify your choice. (3)

C) Compare selective adhesion and pre-plating methods of cell selection. Analyse the pros and cons of these methods. (4)

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