Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal 576104)

VII SEM B.Tech (BME) DEGREE END-SEMESTER EXAMINATIONS, DEC/JAN 2020-21

SUBJECT: TISSUE ENGINEERING (BME 4010)
(REVISED CREDIT SYSTEM)
Friday, 1st January 2021, 9 AM to 12 NOON

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to Candidates:

1. Answer ALL questions.
2. Draw labeled diagram wherever necessary.

1.	(a)	What makes fiber connective tissue a dense connective tissue? Explain with reason for the difference in strength between regular and irregular dense connective tissues. (may use mathematics to justify your answer)	3
	(b)	Explain the strategies you would adopt to sterilize the following items: (i) sharp instruments (ii) hospital bed mattress (iii) culture medium (iv) radiation sensitive biopolymer.	2
	(c)	(i) Explain the roles of polycomb group protein and G1 phase regulators for regulating the self-renewal of mesenchymal stem cells (ii) How does embryonic stem cell avoid replicative cell senescence.	5
2.	(a)	Distinguish and analyze the ligand driven and receptor driven processes involved in cellular signaling in skin. Must mention the cell signaling pathways associated with.	5
	(b)	Stem cells can be collected from early embryos. Stem cells can also be collected from adult bone marrow. How would you assess the regenerative potentials of both these stem cells by *in vivo* process? Evaluate the use of stem cells from embryos or from adult bone marrow for treating human diseases.	5

3. (a) Biopolymer (Poly –A) has sol gel transition temperature 32-35°C. Briefly explain the strategies to make mechanically strong Poly-A scaffold for tissue engineering applications. How would you evaluate porosity and microstructural analysis of the poly-A scaffolds? (mention the technique used) 3+2

(b) You are asked to make interconnected porous scaffolds. Explain the rationale for using the following techniques-porogen leaching, freeze drying (lyophillization) and 3D printing. 5

4. (a) Explain the different steps of harvesting cells. 3

(b) What is "cell line"? Compare the working of penetrant and non-penetrant cryo-protectants. 3

(c) Explain the working of fibronectin coated and antibody coated culture dish for the selection methods of cells. 4

5. (a) Explain briefly, the stages of isolation of mouse embryonic stem cells. 3

(b) Mention the major components of tissue culture medium with purpose. 4

(c) Explain the steps involved in ACT. 3