	Reg. No.	
MANIPAL INSTITUTE OF TECHNOLOGY		
VII SEMESTER B.Tech. (BME) DEGREE END SEM. EXAMINATIONS, NOV/ DEC 2016.		
SUBJECT: TISSUE ENGINEERING (BME 431) (REVISED CREDIT SYSTEM) Monday, 28 th November 2016: 2 PM to 5 PM TIME: 3 HOURS MAX. MARKS: 100		
Instructions to Candidates:		
Answer any five full questions.		
1A.	Explain the types and basic components of connective tissues.	6
1 B .	20 spherical gelatin beads were prepared in the laboratory. When all these lever immersed in deionized water, the water level rose by 1.2ml (void volu Calculate the diameter of each bead.	ume). 4
1C.	What would be your strategy to sterilize the following: (i) Collagen scaffold (ii) vaccine, (iii) liquid culture media, (iv) operation table	10
2A.	What are the functions of 'HEPA Filter' and 'membrane filter'? Explain osmotic pressure can be used for sterilization.	how 3+3
2B.	Discuss specifically the role of ectoderm and mesoderm in the developme epidermis and dermis.	nt of 8
2C.	State the principles associated with the following sterilization methods: (i) Dry heat sterilization, (ii) moist heat sterilization, (iii) UV-rays.	6
3A.	Explain the role of the following in cell signaling process: (i) Ligand (ii) receptor, (iii) secondary messenger, (iv) transcription factor.	8
3B.	With specific reference to skin, explain how 'ligand' and 'receptor' regulate signaling process.	e cell 10
3C.	What is the fate of excess osteoblast after sclerostin limits overflow o resorption pit?	f the 2

- 4A. Explain the process involved in the isolation of mouse embryonic stem cells.5+5 Explain the *in vivo* method to assess the regenerative potential of both embryonic and adult stem cells.
- 4B. Distinguish between:
 (i) Embryonic fibroblast cell and feeder cells, (ii) de-differentiation and re-differentiation of stem cells.
- **4C.** Analyze how early G1 phase regulators influence adult stem cell properties. How **5** would you assess the onset of differentiation of stem cells?
- 5A. How would you harvest fibroblast cell from a human subject (primary culture)? 4 How would you convert them to cell line?
- 5B. Explain the working of the following selection methods:
 (i) Antibody panning, (ii) pre-plating, (iii) rate zonal gradient centrifugation, (iv) selective adhesion using fibronectin.
- **5C.** How would you use silk protein (sericin) to fabricate interconnected porous **4** scaffolds? Write down your strategies in a logical manner.
- 6A. Explain autologous chondrocyte transplantation (ACT) in the context of artificial 5 induction of cartilage repair.
- 6B. (i) Why are Embryonic stem cells able to counter Hayflick's limitation?
 (ii) Why is Feeder cells used during stem cell isolation?
 (iii) How does Polyethylene glycol work as non-penetrant cryo-protectant?
 (iv) What would be the consequence if medium formulated for 5% CO₂ is put in 10% CO₂ incubator accidentally?
- 6C. Highlight the significance of the following components in cell culture medium:(i) sodium bicarbonate, (ii) serum, (iii) amino acid, (iv) phenol red, (v) antibiotics