Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH (BME)/SEM-8/BME-803D/2011

2011

TISSUE ENGINEERING

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

i) An example of CAM is

a) Cadherin b) growth hormone

c) Protease d) Serine.

ii) For skin grafting the scaffold used should be

a) biodegradable b) bioactive

c) biocompatible d) both (a) and (c).

iii) The formation of blood vessel from the pre-existing blood vessel is known as

a) angiogenesis b) vascularization

c) osteogenesis d) phagocytosis.

iv) The major histocompatibility complexes (MHCs) are

a) signalling molecules

b) growth factors

c) cell surface markers

d) cell adhesion molecules.

v) Cells respond to signals at distant location via

a) autocrine stimulation

b) neurotransmitter

c) hormone

d) cytokine.

vi) Bone morphogenic protein (BMP) is a

a) cell surface marker

b) growth factor

c) hormone

d) neurotransmitter.

vii) Establishment of tissues in ex-vivo implies

a) implants

b) scaffolds

c) extracorporeal devices

d) artificial aids.

viii) Polyglycolic acid (PGA) scaffold is

a) biotolerant b) bioactive

c) bioinert d) biodegradable.

ix) In tissue engineering, harvested cells are frozen and stored in

a) liquid hydrogen b) liquid nitrogen

c) liquid helium d) autoclave.

x) Cell signalling compounds cytokines are a group of

a) proteins and peptides

b) fats and triglycerides

c) carbohydrates

d) hormones and steroids.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is vasualization ? Describe the mechanism of basic wound healing. 2 + 3

3. With the help of a suitable diagram explain the process of differentiation of stem cells into cell lines. 5

4. How is bacterial cell culture carried out under laboratory conditions ? How is sterile condition maintained in the cell culture laboratory ? 3 + 2

5. What are the different risk factors involved with skin grafting ? How is GVHD prevented ? 3 + 2

6. Define the term 'cellular differentiation'. Mention the basic properties of stem cell. 3 + 2

7. Describe different kinds of matrix materials used in tissue engineering. Mention the importance of growth factors in this field. 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. Define the term 'angiogenesis'. Describe the process of angiogenesis along with chemical stimulatants. Mention the current scope of development and therapeutic uses of tissue engineering. 3 + 6 + 6

9. Give a brief overview of receptor-ligand binding mechanism. Describe the signalling pathway for cell's response to the ligand. What is cell surface marker ? 6 + 7 + 2

10. a) What are the different pathways of signal transduction in the eukaryotic cell ? 7

    b) What are the different forms of cell signalling ? Explain with examples. 5 + 3

11. With the help of a suitable case study explain Bone Marrow Transplanation. What is the importance of chemotherapy in Myeloblastic leukemia ? Why do you think the success rates of BMT are quite low even with today's advanced technology ? 7 + 3 + 5

12. What are Bioreactors and how do they function ? Give the diagram of a typical Bioreactor. Explain cell seeding in a Bioreactor. 7 + 5 + 3

13. Write short notes on any *two* of the following : 2 × 7 { EQ \F(1,2) }= 15

    a) Transplant immunology

    b) Cell preservation and storage

    c) Cells for tissue engineering

    d) Engineering tissues for bones and cartilage

    e) Cell incorporation into the scaffold.