Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/BME/SEM-8/BME-803D/2013

2013

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 : $10 \times 1 = 10$

i) The formation of blood vessel is known as

a) angiogenesis b) vascularization

c) osteogenesis d) phagocytosis.

ii) The protein of cell that binds to a specific molecules is known as

a) ligand b) receptor

c) hormone d) cytokine.

iii) Polyglycolic Acid (PGA) scaffold is

a) biotolerant b) bioactive

c) bioinert d) biodegradable.

iv) Bone Morphogenic Protein (BMP) is a

a) cell surface marker b) growth factor

c) hormone d) neurotransmitter.

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

a) liquid hydrogen b) liquid nitrogen

c) liquid helium d) autoclave.

vi) The Major Histocompatibility Complexes (MHCs) are

a) signaling molecules

b) growth factors

c) cell surface markers

d) cell adhesion molecules.

vii) *c*-AMP and *c*-GMP function as

a) hormone b) receptor

c) second messenger d) ligand.

viii) Cell signaling compounds cytokines are a group of

a) proteins and peptides

b) fats and triglycerides

c) carbohydrates

d) hormones and steroids.

ix) Carbon nanotubes are used for tissue engineering scaffolds as they are

a) biocompatible b) biodegradable

c) biopolymers d) none of these.

x) PLA degrades within the body to form

a) amino acid b) glycolic acid

c) lactic acid d) phosphoric acid.

GROUP – B
(Short Answer Type Questions)

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

2. What are CAMs ? What are the different types of CAMs associated with cell signalling ? How do CAMs help to transmit signals ? 2 + 2 + 1

3. What are the basic criteria of a scaffold used for tissue reconstruction ? Give two common examples of scaffolds constructed from natural materials. State three major components of ECM. 2 + 2 + 1

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

5. Define the term “cellular differentiation”. Mention the basic properties of stem cell. 3 + 2

6. What are the possible uses of ceramics ? Give the advantages and disadvantages of ceramic implants. 2 + 3

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 stimulants. Mention the current scope of development and therapeutic uses of tissue engineering. 3 + 6 + 6

9. Give a brief overview of growth factor and its significance. Describe the signaling pathway for cell's response to the ligand. What is cell surface marker ? 6 + 7 + 2

10. What is a Bioreactor ? Why is cell seeding important in a Bioreactor ? How do bioreactors function for engineering 3D-tissue construction ? 2 + 3 + 10

11. a) What is stem cell ? Briefly explain the different types of stem cells. 2 + 9

    b) Give a brief overview of receptor-ligand binding mechanism. 4

12. a) Cytokines are a unique family of growth factors. Justify.

    b) With the help of a suitable diagram, explain the different pathways for cell signalling. 5 + 10

13. Write short notes on any *three* of the following : 3 × 5

    a) Transplant immunology

    b) Cell preservation and storage

    c) Cells for tissue engineering

    d) Engineering tissues for bones and cartilages

    e) Degradable scaffold materials.