



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS / B.TECH.(BME) / SEM-8 / BME-803D / 2012**

**2012**

**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) Pluripotent Stem cells are
  - a) Undifferentiated
  - b) Differentiated
  - c) Adult Stem cells
  - d) Matured cells.
- (ii) Bleeding, Inflammation, Proliferation, Remodelling are phases of
  - a) Wound healing
  - b) Clotting
  - c) Cell differentiation
  - d) Cell maturation.
- (iii) An enzyme which adds phosphate to a protein is
  - a) Phosphatase
  - b) Kinase
  - c) Dehydrogenase
  - d) Reductase.



(iv) CAT codes for

- a) Valine
- b) Alanine
- c) Tryptophan
- d) Tyrosine.

(v) Blood is a

- a) epithelial tissue
- b) connective tissue
- c) nerve tissue
- d) none of these.

(vi) In-vivo tissue compartment are composed of .....  
thick tissue slabs sandwiched by vasculature.

- a) 50  $\mu\text{m}$
- b) 100  $\mu\text{m}$
- c) 150  $\mu\text{m}$
- d) 200  $\mu\text{m}$ .

(vii) Endocrine signaling is performed by

- a) enzymes
- b) hormones
- c) cytokines
- d) carbohydrates.

(viii) GABA is a

- a) neurotransmitter
- b) neuroinhibitor
- c) contact inhibitor
- d) contact excitator.

(ix) Solid Free Forming is a fabrication technique for

- a) 2D scaffold
- b) 3D scaffold
- c) Microscaffold
- d) Nanopatterned scaffold.





**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

8. Explain the DNA double helix structure. What is replication ? What is a Genetic Code ? How is the Genetic Code related to the formation of an amino acid.  $8 + 3 + 4$
9. What do you understand by Signal Transduction ? How are protein Kinase and Phosphatase important in signal transduction ? What are the different types of membrane receptors and what are their functions ?  $5 + 5 + 5$
10. Why are embryonic Stem cells important ? What are the sources of Embryonic Stem Cells ? What are the ethical debates following stem cell research ?  $5 + 5 + 5$
11. How do cells communicate ? What do you understand by Tight and Gap junctions ? Differentiate between Hydrophilic and Hydrophobic Receptors.  $5 + 5 + 5$
12. What is scaffold ? Name the engineering materials used for scaffold fabrication. Mention the important parameter for scaffold selection. Describe the different types of scaffold used in tissue engineering. Briefly explain the process of cell placement on scaffold.  $4 + 2 + 5 + 4$
13.
  - a) What is stem cell ?
  - b) Describe the different types of angiogenesis to mimic nutrient transport within the tissue compartment.
  - c) Demonstrate bioreactor for achieving nutrient transport in an engineered tissue construct.  $2 + 7 + 6$