

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.

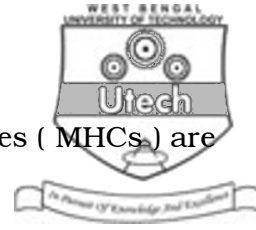
GROUP – A

(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. $3 \times 5 = 15$

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. $3 \times 15 = 45$

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 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 Transplantation. 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 : $2 \times 7 = 14$
- 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.