NATIONAL INSTITUTE OF TECHNOLOGY, ROURKELA
END - SEM EXAMINATION, 2019
SESSION: 2018-2019 (Spring)
B. Tech. Section/Slot: S1/TE

Dept. Code: **BM**, Subject:**Fundamentals of Tissue Engineering**, Subject code: **BM 324**
No. of pages:**01** Full Marks: **50** Duration: **3 *Hours***

All parts of a question should be answered at one place.

S.no	Particulars	Marks
1.	i. Describe a method suitable for producing fibrous scaffold at commercial scale with a neat diagram.	6
	ii. Explain receptor-ligand binding mechanism involved in cell-scaffold interaction.	3
	iii. Define the term "Cellular Differentiation".	1
2.	i. Explain which stage of stem cell development is used for tissue regeneration?	2
	ii. Explain the role of bioreactor in tissue engineering. Explain the simplest bioreactor that provides dynamic culture condition for tissue construct generation.	5
	iii. Explain the importance of cell aggregation? What are the techniques used for measuring cell aggregation.	3
3.	i. List out various modified static cell seeding techniques. Explain magnetic assisted cell seeding method.	4
	ii. What are adult stem cells and what are their unique characteristics? Write various sources of adult stem cells?	3
	iii. Explain the basic principle of flow cytometry and explain its application in tissue engineering.	3
4.	i. Elaborate the following methods for the assessment of cell-scaffold construct. a. Scanning electron microscopy b. MTT Assay c. Alamer Blue Assay	$2\frac{1}{2} \times 3 = 7\frac{1}{2}$
	ii. Explain how biodegradation property of the scaffold influences tissue regeneration.	$2\frac{1}{2}$
5.	i. Compare freeze drying and freeze gelation technique for scaffold fabrication.	2
	ii. Scaffold should be mechanically strong enough to host stem cells for tissue reconstruction. What method do you adopt for selecting such biomaterial for tissue scaffold development?	3
	iii. A bioploymeric scaffold was treated in SBF solution for a period of 14 hrs. in presence of lysozyme enzyme to study its biodegradation property. The experimental results are recorded as follows-	5

Time (hr)	0	2	4	6	8	10	12	14
Weight (gm)	1.23	1.22	1.19	1.16	1.12	1.07	1.03	0.98

Explain the degradation pattern of scaffold by graphical method.