Reg. No.										

MANIPAL
ACADEMY of HIGHER EDUCATION
(Deemed to be University under Section 3 of the UGC Act, 1956)

III SEMESTER B.TECH. (BIOTECHNOLOGY)

END SEMESTER EXAMINATIONS, NOV/DEC 2019

SUBJECT: CELL BIOLOGY [BIO 2153]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A.	Mitochondrial genome is of small size. Recent years have witnessed considerable progress in understanding basic mitochondrial genetics and the relationship between inherited mutations and disease phenotypes. Still one of the major challenges is the treatment of these diseases. Why is it difficult to treat diseases that occur due to inherited mitochondrial DNA?	**4M**
1B.	How do the actin filaments grow and what is the rate-limiting step in their growth?	**3M**
1C.	What are the limitations of using biotin-avidin complex for stainings?	**3M**
2A.	Embryonic stem cells are distinguished by their ability to differentiate into any cell type and by their ability to propagate during development. What type of gene control mechanism is there in embryonic stem cells that enable them to differentiate into so many specialized cell types? Explain.	**4M**
2B.	Initially it was thought that gene regulatory proteins might require direct access to the hydrogen bonds between base pairs in the interior of the double helix to distinguish between one DNA sequence and another. However, it is clear now that the gene regulatory proteins are able to distinguish between one DNA sequence and another without having to open the double helix. How is this achieved?	**3M**
2C.	State with justification if the following statement is true or false, 'Genetic determinants of variation in expression levels may contribute to complex traits and phenotype is not just determined by coding regions'.	**3M**
3A.	Cells communicate in ways that resemble human communication. Decide which of the following forms of human communication are analogous to autocrine, paracrine, endocrine, and synaptic signaling by cells. a)Telephone conversation b)Talking to people at a party	**4M**

	c)A radio announcement d)Talking to yourself	
3B.	Explain how scaffolding proteins help to coordinate a cell's response to incoming signals.	**3M**
3C.	What is meant by signal amplification and how is it achieved?	**3M**
4A.	Analysis of the patterns of mRNA abundance in different cell types shows that the level of expression of almost every active gene is different. The patterns of mRNA abundance are so characteristic of cell type that they can be used to determine the tissue of origin of cancer cells, even though the cells may have metastasized to different parts of the body. By definition, however, cancer cells are different from their non-cancerous precursor cells. How do you suppose then that patterns of mRNA expression might be used to determine the tissue source of a human cancer?	**4M**
4B.	Translocations generate novel chromosomes, but are often linked to disorders like cancer. Explain with an example how chromosomal translocations can result in cancer.	**3M**
4C.	How do Bcl-2 and Bax control the apoptotic pathway in mitochondria?	**3M**
5A.	What is meant by stem cell niche and what is its significance?	**4M**
5B.	Elaborate on the distribution of stem cells in human epidermis, and the pattern of epidermal cell production.	**3M**
5C.	What is the role of hypoxia-inducible factor in inducing angiogenesis?	**3M**