

Date:2-03-2022

Registration number:

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**MSc Biotechnology - I SEMESTER**

**SEMESTER EXAMINATION: October 2021**

(Examination conducted in March 2022)

**BT 7221 – Topics in Cell Biology**

Time- 2 ½ hrs Max Marks-70 This question paper contains 2 printed pages and 3 parts

**Part A (Answer any 10 questions out of 12) 2x10=20marks**

1. What is the role of osmosis in homeostasis? What would a red blood cell do in an isotonic, hypotonic, or in hypertonic solution?
2. What are stem cells and how do they differ from somatic cells?
3. Briefly describe oncogenes.
4. How does lysosomes play a role in degradation?
5. Write a note on second messengers with an example.
6. What stresses promote a cell to undergo autophagy?
7. What happens to the cell cycle when DNA is damaged?
8. Explain the role of TGFβ as a tumor promoter.
9. How does p53 dysregulation result in cancer?
10. Differentiate between necrosis and apoptosis.
11. List a few functions of the extracellular matrix in animal tissues.
12. The following events occur during the various phases of the cell cycle. Name the phase against each of the events.

a. Disintegration of nuclear membrane \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. Appearance of nucleolus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. Division of centromere \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. Replication of DNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part B (Answer any 5 questions out of 7) 5x6=30marks**

1. What is meant by the term signal transduction? Describe some of the steps by which signal transduction occurs using receptor tyrosine kinase as an example.
2. Describe the steps that occur between (a) the time that a TNF molecule binds to its receptor and the eventual death of the cell and (b) the time a proapoptotic Bcl-2 member binds to the outer mitochondrial membrane and the death of the cell.
3. Describe the vesicular membrane transport and give detailed explanation of two types of vesicular transport systems in and out of the cell.
4. What is the role of cytosolic and mitochondrial transport proteins in the process of mitochondrial import?
5. What is the role of the formation of caspase-containing complexes in the process of apoptosis?
6. Different cyclin-Cdks are responsible for triggering different stages of the cell cycle. Elaborate
7. Distinguish between
   * 1. Hemichannel and a gap junction
     2. Desmosome and an adherens junction
     3. Gap junction and plasmodesmata

**Part C (Answer any 2 questions out of 3) 2x10=20marks**

1. a. Give brief description of the various phases of the cell cycle. Explain the role of p53 in cell cycle regulation.

b. Differentiate between endocrine, autocrine and paracrine signalling with examples.

1. a. Describe in detail and illustrate the phagocytosis of *Mycobacterium tuberculosis*.

b. Write note on autophagy, different types of autophagy and the role of ubiquitin in autophagy.

1. a. Provide details of various structures formed during cell migration. Elucidate the role of actin dynamics in cell migration.

b. Describe the role of viruses in cancer and the molecular mechanism of epithelial-mesenchyme-transition (EMT) in metastasis.