B.Sc. (Part-III) (CBCS Pattern) Semester-VI

USBCDST-15 - Biochemistry DSE-III - Advanced Cell Biology

P. Pages : 2 **GUG/S/25/13339**

Time : Three Hours * 1 7 0 4 * Max. Marks : 50

Notes : 1. All the questions are compulsory and carry equal marks.
2. Draw well labelled diagrams wherever necessary.

1. Describe the role of the plasma membrane in maintaining cellular integrity and function. Discuss the various types of membrane transport mechanisms. **10**

OR

a) What are the functions of membrane proteins in cellular transport? **2½**

b) Describe the composition of the nuclear envelope and its significance in transport regulation. **2½**

c) Explain the role of desmosomes and gap junctions in intercellular communication. **2½**

d) How do tight junctions contribute to tissue structure and function? **2½**

2. Describe the phases of the eukaryotic cell cycle and discuss the molecular mechanisms that regulate cell cycle progression. **10**

OR

a) What are the key features of the G1, S, G2, and M phases of the cell cycle? **2½**

b) Differentiate between programmed cell death and accidental cell death. **2½**

c) Explain the role of stem cells in regenerative medicine. **2½**

d) How does hematopoiesis contribute to blood cell formation? **2½**

3. Explain the process of carcinogenesis, highlighting genetic and environmental factors that contribute to cancer development. **10**

OR

a) What is the difference between benign and malignant tumors? **2½**

b) Discuss the role of oncogenes in cancer progression. **2½**

c) How do tumor suppressor genes function in preventing cancer? **2½**

d) What are the emerging therapies for cancer treatment? **2½**

4. Explain the working principles of electron microscopy and its significance in cellular studies. Discuss its advantages over traditional microscopy techniques. **10**

OR

a) How is flow cytometry used in cell sorting and analysis? **2½**

b) What is the role of immunohistochemistry in disease diagnosis? **2½**

c) Describe the major differences between animal and plant cell culture techniques. **2½**

d) What are the applications of ultracentrifugation in cell fractionation? **2½**

5. Attempt **any ten** of the following (One mark each): **10**

a) What is the function of nuclear pores?

b) Define cell adhesion molecules.

c) What are integrins and their role in cell-matrix interactions?

d) What is the significance of the mitotic spindle in cell division?

e) Name one key cyclin involved in cell cycle regulation.

f) What is the role of caspases in apoptosis?

g) Define tumorigenesis.

h) What is the role of p53 in cancer suppression?

i) Name one viral oncogene.

j) What is the principle of confocal microscopy?

k) Define tissue culture.

l) Mention one application of fluorescence-activated cell sorting (FACS).

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