

Term End External Examination 4th Semester (Session- July 2024)

Subject: Biotechnology

Course No and Title: BTGC3422M/Cell signalling and Cancer

Time: 2.15 hours

Max Marks:100

Min. Marks:40

Section A: Objective Type Questions

Q1. Choose the appropriate Answer:

(8x1.5=12)

- i. Which of the following cell adhesion molecules are calcium-dependent?
A Selectins B Integrins
C Immunoglobulin superfamily CAM D Cadherins
- ii. Which structure in animal cells is functionally similar to plasmodesmata in plant cells?
A Gap junctions B Tight junctions
C Desmosomes D Adherens junctions
- iii. What triggers the degradation of cyclins in the cell cycle?
A CDK inhibitors B Phosphorylation
C Dephosphorylation D Ubiquitin-proteasome pathway
- iv. Which of the following is a key difference between meiosis and mitosis?
A Mitosis involves two rounds of division, meiosis involves one
B Meiosis produces genetically identical cells, mitosis does not
C Meiosis reduces the chromosome number by half, mitosis does not
D Mitosis occurs only in reproductive cells, meiosis occurs in all cells
- v. A hormone or ligand can be considered as
A First messenger B Second messenger
C Third messenger D Fourth messenger
- vi. G-protein coupled receptors contain _____ transmembrane alpha helices.
A 2 B 3
C 5 D 7

- vii. Angiogenesis is the process of formation of
A Cancer cells B Blood vessels
C Tissues D Immune cells
- viii. Oncogenes are derived from
A Normal genes (proto-oncogenes) B Tumour suppressor genes
C Viral genes D Mitochondrial DNA

Section-B: Descriptive Type Questions (Short Type)

Q2: Answer all the Questions

(8 x 4 =32)

- i. Differentiate between desmosomes and hemidesmosomes.
- ii. How do homophilic CAMs differ from heterophilic CAMs?
- iii. What are Caspases? Write two examples.
- iv. What is interphase?
- v. What are protein tyrosine kinases?
- vi. Define second messengers and write two examples.
- vii. List some important causes of cancer.
- viii. Why is p53 described as guardian of genome?

Section – C: Descriptive Type Questions (Medium Type)

Answer all the questions:

(4 x 7=28)

- Q3. What is a cell junction? Describe briefly various types of cell junctions.

OR

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What are the four major families of cell adhesion molecules?
Discuss the role of any one of these.

Q 4. Define mitosis and discuss its various stages.

OR

Explain the role of CDKs in cell cycle.

Q 5. Describe briefly the Ras-MAPK pathway outlining its key components, and role in cellular processes.

OR

What is cell signalling? Distinguish between autocrine, paracrine and endocrine signalling.

Q 6. What is cancer? Describe the basic features that differentiate cancer cells from normal cells.

OR

Write brief notes on tumour suppressor genes and oncogenes.

Section – D: Descriptive Type Questions (Long Type)

Answer any two of the following: (2 x 14=28)

Q 7. What are the functions of extracellular matrix in animal tissues?
Describe its major components.

Q 8. Why do cells undergo apoptosis? Explain the intrinsic pathway of apoptosis, highlighting the role of mitochondria.

Q 9. What is cell signalling? Elucidate the general structure and mechanism of signal transduction through GPCR.

Q 10. Discuss the various therapeutic interventions used in the treatment of cancer.