

2. Explain how chromatin structure and nucleosome positioning influence transcription. 15
3. Discuss the mechanisms of programmed cell death. Highlight the role of caspases and regulatory genes in apoptosis. 15
4. Importance of checkpoints in cell cycle. What happened if G2 checkpoints fail and cell enters mitosis. 15
5. Describe the different types of signaling molecules and their receptors. Explain the cAMP signaling pathway and its role in cellular responses. 15
6. (a) Explain how radiation and chemical carcinogens induce cancer at the molecular level. 7
(b) How was the first human oncogene (ras) identified using gene transfer experiments?
7. Write short notes on any **three** of the following: 3×5=15
 - (i) Protein Noggin influence neurogenesis
 - (ii) Loss of E-cadherin and carcinomas.
 - (iii) Four transcription factors used to create iPSCs
 - (iv) Nucleosome positioning

[This question paper contains 4 printed pages]

Your Roll No. :**Sl. No. of Q. Paper** : **227** **I**

Unique Paper Code : 2233012006

Name of the Paper : DSE-4: Cell Growth and Regulation

Name of the Course : **B.Sc. (H) Zoology and B.Sc. LifeSciences, (NEP)**

Semester : IV NEP (DSE-4)

Time : 3 Hours **Maximum Marks : 90****Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **FIVE** questions in **all**. Question **NO.1** is compulsory.
- (c) Draw labeled diagrams wherever necessary.

1. (a) Define the following (**Any Six**): 1×6=6
 - (i) Silencers
 - (ii) Cloning
 - (iii) Growth factors

- (iv) Cell lines
- (v) Cytokinesis
- (vi) Kinetochore
- (vii) Aurora Kinases.
- (b) Differentiate between the following **(Any Four)**: 2×4=8
 - (i) Naïve ESCs vs. Primed ESCs
 - (ii) Reproductive Cloning vs. Therapeutic Cloning
 - (iii) Restriction Point and DNA Damage Checkpoint
 - (iv) Activators and repressors.
 - (v) Oncogenes and tumour suppressor genes
- (c) Write the significance of the following **(Any Four)**: 1×4=4
 - (i) MCM helicase in DNA replication
 - (ii) CREB transcription factor
 - (iii) Chromatin remodeling complexes
 - (iv) p53 protein
 - (v) Casein Kinase-1 (CK1)
- (d) Briefly explain with example/use/role the following **(Any Four)**: 1×4=4
 - (i) Adult stem cell.
 - (ii) Gene enhancers.

- (iii) P53
- (iv) Checkpoints
- (v) Regenerative medicine
- (e) Fill in the blanks **(Any Four)**: 1×4=4
 - (i) The proteins that regulate cell cycle progression by activating CDKs are called
 - (ii) Epidermal Growth Factor (EGF) stimulates of cells.
 - (iii) DNA sequences that enhance transcription from a distance are called
 - (iv) The gene is the most common target of genetic alterations in human malignancies.
 - (v) The pathway that commonly leads to activation of transcription factor CREB is the pathway.
- (f) Expand the following **(Any Four)** 1×4=4
 - (i) EGFR
 - (ii) Bcl-2
 - (iii) MAPK
 - (iv) ROS
 - (v) Caspase