

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025  
(Sixth Semester)

Branch – BIOCHEMISTRY

**CELL A MOLECULAR APPROACH**

Time: Three Hours

Maximum: 50 Marks

**SECTION-A (5 Marks)**

Answer ALL questions

ALL questions carry EQUAL marks. (5 x 1 = 5)

- 1 The protein p53 primarily regulates the cell cycle at which checkpoint?  
(i) G1/S (ii) G2/M  
(iii) Metaphase-Anaphase (iv) S phase
- 2 Which type of cancer originates from epithelial cells?  
(i) Sarcoma (ii) Carcinoma  
(iii) Leukemia (iv) Lymphoma
3. \_\_\_\_\_ property is essential for a scaffold used in tissue engineering?  
(i) Toxicity (ii) Rigidity without porosity  
(iii) Biocompatibility (iv) Immunogenicity
- 4 In molecular diagnostics, which step is crucial for ensuring specificity in PCR-based detection of infectious diseases?  
(i) The choice of restriction enzymes for DNA cleavage  
(ii) The selection of specific primers that bind to target DNA sequences  
(iii) The use of fluorescent dyes for visualization  
(iv) The direct sequencing of entire genomes
- 5 Which type of genetic marker is most commonly used in physical maps of human chromosomes?  
(i) RFLPs (ii) Microsatellites  
(iii) Isozymes (iv) Single Nucleotide Polymorphisms (SNPs)

**SECTION - B (15 Marks)**

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6 a How is the cell cycle regulated in yeast cells? Describe the role of Cdc28 in yeast.  
OR  
b Describe the differences between totipotent, pluripotent, and multipotent stem cells.
- 7 a Outline the process of metastasis. What are the molecular and cellular mechanisms involved in cancer cell migration and invasion?  
OR  
b Outline the mechanism by which retroviral oncogenes induce tumor formation.
- 8 a Summarise the significance of scaffolds in tissue engineering and their impact on cell proliferation and differentiation.  
OR  
b Define regenerative tissue engineering and explain how it differs from traditional tissue grafting techniques.

Cont...

- 9 a Brief on the principle and applications of Polymerase Chain Reaction (PCR) in the molecular diagnosis of genetic and infectious diseases.  
OR  
b How does a scatter plot help in analyzing molecular and cellular behavior? Provide an example of its application in disease research.
- 10 a Describe the strategies used for cloning disease-related genes.  
OR  
b Show how physical maps of human chromosomes are constructed.

**SECTION -C (30 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Explain the mechanism of receptor tyrosine kinases (RTKs) in cell signaling.  
OR  
b Differentiate between intrinsic and extrinsic apoptotic pathways.
- 12 a Distinguish cancer cells from normal cells based on their properties. Discuss with examples.  
OR  
b Discover the role of oncoproteins in cell cycle regulation and tumor formation.
- 13 a Compare embryonic stem cells (ESCs) and adult stem cells in terms of their potential for differentiation and therapeutic applications.  
OR  
b Outline the procedure of hematopoietic stem cell transplantation (HSCT) and its role in treating blood disorders.
- 14 a Discuss the working principle of DNA microarrays and their role in gene expression analysis and disease diagnosis.  
OR  
b Elucidate the methods used for studying protein-protein interactions.
- 15 a Describe the process of positional cloning and how it is used to identify genes responsible for genetic disorders.  
OR  
b Discuss the objectives, methodology, and significance of the Human Genome Project (HGP).

Z-Z-Z

END