

**M.Sc. ZOOLOGY**  
**FOURTH SEMESTER (SPECIAL REPEAT)**  
**CELL & MOLECULAR BIOLOGY-II**  
**MSZ-402 A**

**SET**  
**A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

( Objective )

Time: 30 mins.

Marks: 20

*Choose the correct answer from the following:*

*1 × 20 = 20*

- Genomic library is normally made by:
  - α phage vector
  - λ phage vectors
  - β phage vectors
  - γ phage vectors
- Long probes are usually made by:
  - Gene expression
  - Cloning
  - Hybridization
  - PCR
- Cutting certain genes out of molecules of DNA requires the use of special:
  - Degrading nucleases
  - Restriction endonucleases
  - Eukaryotic enzymes
  - Viral enzymes
- The enzyme used in the polymerase chain reaction is:
  - Restriction endonuclease
  - Reverse transcriptase
  - DNA polymerase
  - RNA polymerase
- The human genome project began as researcher's mapped \_\_\_\_\_ and sites of cytogenetic abnormalities.
  - RFLPs
  - Lods
  - PCRs
  - VNTRs
- Which out of the following statements is true about G-protein couple receptors?
  - The N-terminal chain is extracellular and C-terminal chain is intracellular
  - It contains 5 trans-membrane hydrophobic sections
  - There are more extracellular loops than intracellular loops
  - The binding region for G-protein involves 2 extracellular loops
- Which out of the following is not involved in signal transduction by β-adrenergic receptor pathway?
  - GTP
  - ATP
  - cAMP
  - cGMP
- Which of the following statements is not true about a ligand-gated ion channel receptor?
  - Ligand-gated ion channel receptors are present in the cell membrane
  - Neurotransmitters can act as the chemical messengers for ligand-gated ion channels
  - Ligand-gated ion channels consist of five glycoproteins
  - Differences in membrane potential affect whether ligand-gated ion channel receptors open or close

9. Which second messenger signals the release of  $\text{Ca}^{++}$  from the endoplasmic reticulum?
- Cyclic AMP
  - Cyclic GMP
  - 1,2 diacyl glycerol
  - Inositol triphosphate
10. The intermediate filament present in nail and hair is a type I IF protein made of:
- Lamins
  - Vimentins
  - Keratins
  - Tubulins
11. A membrane transport is said to be a carrier protein if:
- It forms an open pore through which a molecule can diffuse
  - An electrochemical gradient is necessary for transport to occur
  - It only allows transport down a concentration gradient
  - It binds to the molecule and changes shape during transport
12. The substrate for restriction enzyme is:
- Single stranded RNA
  - Double stranded RNA
  - Cell wall proteins
  - Double stranded DNA
13. To be a vector, a plasmid does not require:
- An origin of replication
  - An antibiotic resistance gene
  - A restriction site
  - To have a high copy number
14. The original enzyme used in PCR reaction is:
- DNA polymerase
  - RNA polymerase
  - Taq polymerase
  - All of the above
15. Rapid method of chromosome identification in intersex is:
- FISH
  - PCR
  - Karyotyping
  - None of the above
16. What roles in regulating the intrinsic pathway of apoptosis are played by the Bcl-2 protein family members Bax & Bcl-2?
- Bax inhibits apoptosis while Bcl-2 stimulates apoptosis
  - Bax stimulates apoptosis while Bcl-2 inhibits apoptosis
  - Both Bax & Bcl-2 inhibit apoptosis
  - Both Bax & Bcl-2 stimulates apoptosis
17. Which of the following are killed by extrinsic apoptosis pathway?
- Cells with damaged DNA
  - Developing nerve cells that fail to make profitable connections
  - Irradiated cells
  - Virus infected cells
8. Which of the following statement about aging is not true?
- Mutation rate in mitochondria is 10-20 times faster than the nuclear DNA mutation rate
  - Vitamin A & C are inhibitors of ROS
  - Mutation in *methuselah* gene in *Drosophila* stimulates production of ROS
  - Both b & c
9. Which of the following statement about 'Rb' tumor suppressor protein is corrected?
- Rb is activated when phosphorylated by Cdk
  - Rb binds the transcription factor E2F and thus prevents the cell from entering S-phase
  - Rb is a transcription factor
  - All the above statement

20. Which of the following is a characteristic of a malignant rather than a benign tumour?
- a. Undergoes metastasis
  - b. Develops a blood supply
  - c. Cells divide an ultimate number of times
  - d. Grows without needing a growth signal

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**( Descriptive )**

Time : 2 hr. 30 mins.

Marks : 50

[ Answer question no.1 & any four (4) from the rest ]

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|---|----------|
| 1. a) How will you perform the amplification of a DNA fragment with the help of a PCR apparatus?<br>b) Write a detailed note on the applications of PCR.                                      | 6+4=10   |
| 2. Why cancer cells are said to be monoclonal in origin? Write the differences between a normal cells & a cancer cell. Explain with diagram, the development of Cancer cell from normal cell. | 2+3+5=10 |
| 3. What is flow cytometry? Explain how it is used in cell sorting and analyzing the apoptotic cells.  | 2+8=10   |
| 4. Explain the ultra structure of Kinesin molecule with diagram. Explain the role of Microtubules as agents of Intracellular motility.  | 4+2+4=10 |
| 5. Write short notes on:<br>a) Gene isolation<br>b) Genome libraries  | 5+5=10   |
| 6. Write a note on Ion- channel linked receptors. Describe the working mechanism of GPCR.   | 5+5=10   |
| 7. What is apoptosis? What are the different pathways of apoptosis? Explain with proper illustration about intrinsic pathway of apoptosis.  | 2+2+6=10 |
| 8. What is Human Genome Project (HGP)? How it has been achieved? Write its salient features.  | 2+3+5=10 |

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