2½ Hours **Total Marks: 75**

1. Attempt **all** questions.
2. **All questions** carry **equal** marks.
3. Draw **neat, labelled diagrams** wherever necessary.
4. Use of **log tables** and **non-programmable calculators** is **allowed**.

Q.1 **Select the correct alternative: (Any Fifteen)** **15**

1 The G1 checkpoint is
   a. the point of commitment to the cell cycle
   b. the beginning of DNA replication
   c. the checkpoint, which is reversible
   d. the beginning of Mitosis

2 Embryonic cell cycle
   a. lacks GI and G2 phases
   b. lacks S phase
   c. lacks M phase
   d. lacks the G1 phase only

3 The exit from mitosis for a cell requires
   a. synthesis of cyclin
   b. degradation of cyclin
   c. cdk activation
   d. cdk inactivation

4 The extracellular messenger for triggering the extrinsic pathway is
   a. TNF b. FADD c. TNFR d. EGFR

5 In a multicellular animal, the most probable reason for the cell to enter the G0 state is
   a. Lack of suitable temperature
   b. lack of growth factor
   c. lack of environmental interaction
   d. lack of division

6. Which receptor type dimerizes upon ligand binding and autophosphorylates?
   a. G-protein-coupled receptor (GPCR)
   b. Ion-channel-linked receptor.
   c. Receptor tyrosine kinase (RTK).
   d. Intracellular (nuclear) receptor

7 In endocrine signalling, the signalling molecules:
   a. Act on the same cell that produces them.
   b. Act on nearby cells in the local environment.
   c. Travel long distances via the bloodstream to target cells
   d. Do not bind to any receptor

8 Which receptor is also called a "serpentine receptor" due to its 7 transmembrane domains?
   a. Ion-channel-linked receptor
   b. G-protein-coupled receptor (GPCR)
   c. Receptor tyrosine kinase (RTK).
   d. Intracellular (nuclear) receptor

9 Computer-based neural networks can be trained to:
a. Perform complex tasks by learning from data.
b. Only store information without processing.
c. Replace DNA in cell signalling.
d. Work without any input or training.

10 Which receptor is called a "serpentine receptor" because it has 7 transmembrane domains?
a. Ion-channel-linked receptor
b. G-protein-coupled receptor (GPCR).
c. Receptor tyrosine kinase (RTK).
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11 Which of the following statements is INCORRECT about a zygote?
a. Its totipotent cell
b. It has a genome set only from Ova
c. Its diploid
d. It divides very rapidly

12 Autonomous specification gives rise to a pattern of development referred to as _____
a) mosaic development
b) morphogenetic determinants
c) cell fate
d) blastomere

13 Which of the following is the INCORRECT statement about model organisms?
a. should have a long life cycle
b. should have a small adult size.
c. should be easily available.
d. should be inexpensive.

14 In autonomous specification, the blastomere contains
a. Positional information
b. Pattern information.
c. should be easily available. Signal for concentration gradient.
d. Competence to induce from neighbouring cells

15 Morphogenesis is concerned with
a. the Shape of tissue, organ and entire organisms
b. Cell growth
c. Cell differentiation
d. Cell mass

16 Chronic Hepatitis B infection increases the risk of liver cancer due to_____
a) Viral RNA replication
b) Chronic tissue damage and inflammation
c) Production of aflatoxin
d) Inhibition of apoptosis

17 Which of the following viruses is associated with adult T-cell leukaemia?
a) EBV b) HTLV-1 c) HPV d) Hepatitis B

18 The loss of _____ cell surface adhesion molecule is important in the development of carcinomas.
a) Integrin b) Cadherin c) E-cadherin d) Fibronectin

19 Tumour suppressor genes generally function by_____ .
a) Stimulating uncontrolled cell proliferation
b) Inhibiting excessive cell division and promoting DNA repair
c) Triggering viral integration
d) Enhancing telomerase activity

20 _____ property makes cancer cells immortal.
a) Loss of adhesion molecules
b) Telomerase reactivation
c) Increased protease secretion
d) Contact inhibition loss

Q2A)	What is Maturation Promoting Factor (MPF)? Explain its structure and composition, and describe experimental evidences that demonstrate MPF's role as a cytoplasmic regulator of the cell cycle.	8
Q2B)	Explain the mechanism of cell cycle control in yeasts, highlighting the key regulators, checkpoints, and differences between *Saccharomyces cerevisiae* and *Schizosaccharomyces pombe*.	7
	OR	
Q2C)	What is Apoptosis? Discuss the intrinsic pathway of apoptosis.	8
Q2D)	Discuss the interphase and M phase of the standard cell cycle.	7
Q3A)	Describe the structure of G Protein-Coupled Receptors (GPCRs) with a neat labelled diagram.	8
Q3B)	Write a note on computer-based neural networks (Artificial Neural Networks).	7
	OR	
Q3C)	Explain receptor dimerization in receptor protein-tyrosine kinases (RTKs) with labelled diagram.	8
Q3D)	Explain the concept of target cell adaptation with the help of bacterial chemotaxis.	7
Q4A)	Express an account of the significance of model organisms in the study of developmental biology with a suitable example.	8
Q4B)	With reference to developmental biology- (a) pattern formation (b) cytoplasmic determination.	7
	OR	
Q4C)	What is Morphogen? Explain various types of morphogenetic movement.	8
Q4D)	Discuss the criteria of selection of a model organism, explain by citing one example	7
Q5A)	Discuss the role of the Rb gene and how its mutation contributes to cancer.	8
Q5B)	Give an account of chemotherapy used in cancer treatment.	7
	OR	
Q5C)	Elaborate on tumour progression.	8
Q5D)	Explain the concept that cancer is a microevolutionary process.	7