

3 Hours

Total Marks: 100

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 a. Select the correct alternative: (Any Six)****06**

1. The resting phase is \_\_\_\_\_.  
a. G1                      b. G2                      c. G0                      d. S
2. One of the major differences between a standard cell cycle and an embryonic cell cycle is \_\_\_\_\_.  
a. standard cell cycle is prolonged  
b. Embryonic cell cycle is prolonged  
c. standard cell cycle, cell division occurs rapidly  
d. embryonic cell cycle cell division occurs more rapidly
3. During cell cycle the cell to exit from mitosis requires \_\_\_\_\_.  
a. cdk activation  
b. cdk inactivation  
c. synthesis of cyclin  
d. degradation of cyclin
4. \_\_\_\_\_ is an example of a broad specificity growth factor in cell growth of multicellular organisms  
a. TNF                      b. erythropoietin                      c. PDGF                      d. estrogen
5. Yeasts are used as models for cell cycle studies for all reasons EXCEPT  
a. They are unicellular, so easily maintained  
b. They reproduce as fast as Bacteria  
c. They are well suited for cloning studies  
d. They are suitable for Microinjection studies
6. In fission yeast the more stringent size check point is at \_\_\_\_\_.  
a. G1                      b. G2                      c. G0                      d. spindle check point
7. The inhibitory kinase in yeast cell cycle is \_\_\_\_\_.  
a. Wee1                      b. MO15                      c. cdc25                      d. cdc13
8. Apoptosome consists of \_\_\_\_\_.  
a. Cytochrome C+apaf1  
b. Cytochrome C +apaf1+Procaspase 9  
c. apaf1 +procaspase 9  
d. Cytochrome C +procaspase 9

9. The unique feature of cell cycle in multicellular animals is that
  - a. the cell cycle is simple and can be easily predicted.
  - b. the cell cycle is more complex and gene duplication has created many variants.
  - c. the cell cycle can be completely overwritten by environment.
  - d. the cell cycle cannot be controlled.

**Q.1 b. Answer the following questions: (Any Two)**

**14**

1. Discuss in detail cell cycle regulators and checkpoints.
2. Diagrammatically explain the ligand-receptor-mediated pathway of apoptosis.
3. With reference to embryonic cell cycle discuss
  - a. MPF composition and function.
  - b. Two experimental evidences of cytoplasmic regulator- MPF.

**Q.2 a. Select the correct alternative: (Any Six)**

**06**

1. Receptors present inside the cytoplasm are called \_\_\_\_\_ receptors.
  - a. intracellular
  - b. extracellular
  - c. matrix
  - d. Neural
2. G protein consists of \_\_\_\_\_ protein subunits.
  - a. alpha, beta, gamma
  - b. alpha, beta, delta
  - c. alpha, delta, gamma
  - d. delta, beta, gamma
3. \_\_\_\_\_ is present in small amounts in the inner half of plasma membrane lipid bilayer.
  - a. PIP 2
  - b. PIP 10
  - c. PIP 5
  - d. PIP 7
4. RTK is an example of \_\_\_\_\_ receptors.
  - a. enzyme coupled
  - b. G protein coupled receptors
  - c. ionotropic
  - d. Ca<sup>+</sup> gated ion
5. PDGF receptors are examples of \_\_\_\_\_ receptors.
  - a. enzyme linked
  - b. G protein-coupled
  - c. nuclear
  - d. Neutral
6. \_\_\_\_\_ controls the direction of flagellar rotation.
  - a. Che Y
  - b. Che B
  - c. Che T
  - d. Che D
7. In \_\_\_\_\_ signalling, the cell signals to itself.
  - a. autocrine
  - b. paracrine
  - c. endocrine
  - d. neurotransmission
8. Inducible NOs are synthesized by \_\_\_\_\_.
  - a. macrophages
  - b. embryonic cells
  - c. nerve cells
  - d. cardiac cells

9. \_\_\_\_\_ receptors are involved in rapid synaptic signalling between the nerve cells and other electrically excitable target cells.
- a. Ionotropic    b. enzyme coupled    c. nuclear    d. cytoplasmic

**Q.2 b. Give an account on the following questions: (Any Two)**

**14**

1. Activation of Inositol phospholipid signalling pathway.
2. Classes of enzyme coupled receptors.
3. Action of extracellular signal molecules over short and long distance.

**Q.3 a. Select the correct alternative: (Any Six)**

**06**

1. A single neural crest cell can differentiate into any of several different cell types is called \_\_\_\_\_.  
a. Pluripotency    b. Cell division    c. Morphogen    d. Gastrulation
2. Diagram of an organism at an early stage of development that indicates the fate of each cell or region at a later stage of development.  
a. Genome map    b. Fate map    c. Gene map    d. DNA map
3. Zebrafish is a preferred model organism in developmental biology because:  
a. It is the closest mammalian model organism to humans.  
b. It has a transparent embryo  
c. It undergoes external fertilization.  
d. its embryo develops outside the female's body.
4. A fundamental process of animal embryogenesis that employs cellular rearrangements and movements to reposition and shape the germ layers \_\_\_\_\_.  
a. Embryo    b. Zygote    c. Gastrulation    d. Blastulation
5. Which among the following is NOT a derivative of the endoderm germ layer?  
a. Gut tube    b. bone    c. Thymus    d. Lung
6. \_\_\_\_\_ is the first step in defining specific regions of the developing embryo.  
a. mosaic development    b. Axis specification  
c. Regional specification    d. Gastrulation

7. The morphogenic movement \_\_\_\_\_ involves the splitting of one cell sheet into two or more parallel sheets.  
a. involution      b. invagination.      c. Epiboly      d. Delamination
8. The portion of the Drosophila body plan which will produce the tail is called:  
a. Telson      b. Dorsal      c. Thorax      d. Acron
9. Which of the following will be able to form placenta and extra-embryonic tissues embryo?  
a. Inner cell mass      b. Trophoblast      c. Gastrula      d. Notocord

**Q.3 b. Discuss the following: (Any Two)**

**14**

1. With reference to developmental biology:  
a) Zygote and blastula      b) Embryonic stem cell
2. Concept of Fate map, Methods of Construction of fate map, and significance.
3. With reference to gastrulation: Types of cellular movement and Germ layers.

**Q.4 a. Select the correct alternative: (Any Six)**

**06**

1. The following are the characteristics observed in cancerous growth. Select the incorrect one:  
a. defective apoptosis  
b. proper cell differentiation  
c. Establishment of colonies in distant organs  
d. invasiveness
2. A gradual accumulation of mutations in a number of different genes leads to a phenomenon \_\_\_\_\_.  
a. angiogenesis      b. tumor progression      c. sarcoma      d. apoptosis
3. \_\_\_\_\_ is a cancer associated gene family that regulates apoptosis.  
a. Rb      b. BCl2      c. p53      d. Ras
4. The tendency of tumor cells to take high uptake of glucose for rapid proliferation of cancerous cells is termed as \_\_\_\_\_.  
a. Stokes effect      b. Warburg effect      c. Diabetes      d. Hamburg effect
5. It is possible to associate new \_\_\_\_\_ formation with the epigenetic silencing of specific genes.  
a. somatic mutation      b. genetic mutation  
c. euchromatin      d. heterochromatin



6. In the case of \_\_\_\_\_, the cancer-causing alleles produced are generally recessive.
  - a. tumor - suppressor
  - b. proto-oncogenes
  - c. pre oncogenes
  - d. oncogenes.
7. Given below are the steps involved in metastasis. Choose the incorrect one:
  - a. invasiveness
  - b. non-invasiveness
  - c. colonization
  - d. micro metastasis
8. Angiogenesis is \_\_\_\_\_.
  - a. Cell differentiation process
  - b. a type of cancer
  - c. blood vessel formation
  - d. growth factor formation
9. In \_\_\_\_\_ assay to mimic liver metabolism activating extract prepared from rat liver cells is mixed with the carcinogen.
  - a. Ashara test
  - b. Ames test
  - c. Replica plating
  - d. CT scan

**Q.4 b. Attempt the following questions: (Any Two)**

**14**

1. With reference to hallmarks for cancerous growth, discuss
  - a. Cancer cells escape built-in limit to cell proliferation.
  - b. Loss of contact inhibition by cancerous cells.
2. Explain cancer-critical genes and their two classes. Add a note on the role of p53 in controlling cancer.
3. Classification of cancers based on tissues and cell types.

**Q.5 Write Short notes on the following: (Any Four)**

**20**

- a. M-phase.
- b. Caspases and its targets.
- c. Receptor down regulation in slow adaptation.
- d. Any one model organisms in developmental biology.
- e. Contributions of viruses in human cancer.
- f. Changes in Lifestyle and cancer.