**3 Hours** **Total Marks: 100**

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

**Q.1 a. Select the correct alternative (Any six)** **06**

1. The time interval between the DNA replication and mitosis is called the ____ phase of the cell cycle. a. M b. S c. G1 d. G2
2. *Saccharomyces cerevisiae* is also called _____ yeast.
   *a.* Fusion b. fission c. budding d. mushroom
3. _____ enzymes are involved in apoptosis and are a member of cysteine proteases.
   a. Lipases b. ligases c. caspases d. amylase
4. _____is an essential component of MPF and is found in all eukaryotic cells.
   a. Cyclin b. albumin c. protease d. butyrin
5. _____ yeast has rod-shaped cells that grow by elongation at their ends. After mitosis, the cell divides in two by laying down a septum at the center of the rod.
   a. Fission b. budding c. fusion d. mini
6. What happens If an oocyte in interphase is injected with cytoplasm from an oocyte in the M phase?
   a. it drives the recipient oocyte into Mitosis
   b. it drives the recipient oocyte into DNA replication
   c. it arrests the recipient oocyte in interphase
   d. it does not affect the recipient's oocyte
7. The exit from mitosis for a cell requires ____.
   a. synthesis of cyclin b. degradation of cyclin c. cdk activation
   d. cdk inactivation
8. This G1 checkpoint is called _____ in budding yeast.
   a. Start b. stop c. restriction d. spindle
9. In intrinsic pathway an apoptosome consists of _____.
   a. Cytochrome C+apaf1 b. Cytochrome C +apaf1+Procaspase 9
   c. apaf1 +procaspase 9 d. Cytochrome C +procaspase 9

**Q.1 b. Answer the following questions: (Any Two)** **14**

1. Give the overview of the cell cycle and its phases in eukaryotes.
2. Explain the extrinsic pathway of apoptosis with a diagram.
3. With reference to the early embryonic cell cycle and the role of MPF discuss
   a. Differences between the standard cell cycle and the Embryonic cell cycle.
   b. Structure composition, the role of MPF, and oscillations of MPF.

**Q.2 a. Select the correct alternative (Any six)** **06**

1. Communication between the cells is mediated by_____signalling molecules which bind on the plasma membrane receptors.
   a. extracellular b. intracellular c. cytoplasmic d. mitochondrial
2. Hydrophobic ligands have their receptors on_____
   a. plasma membrane b. nuclear membrane c. ribosomes d. lysosomes.
3. G protein is involved in the activity of _____
   a. GPCRs b. Enzyme-linked receptors c. ionotropic receptors
   d. Extracellular matrix.
4. _____ enzyme causes cyclization of AMP to cAMP.
   a. adenylyl cyclase b. Protein kinase A c. Protein Kinase C
   d. Phosphodiesterase
5. _____ is not an example of enzyme coupled receptors.
   a. tyrosine kinase receptors b. serine/threonine kinase receptors
   c. histidine kinase associated receptors d. IP3 dependent.
6. The phosphorylation of _____ activates the protein which causes clockwise rotation and tumbling of flagella. A. Che Y b. Che B c. Che C d. Che D
7. _____ is one of the three layers of interconnected units of computer-based neural networks.
   a. hidden layer b. membrane layer c. dominant layer d. recessive layer
8. A G-protein-linked receptor has _____transmembrane segments.
   a. one b. two c. three d. four.
9. When deprived of the signals, the cell activates a suicide program and kills itself usually by _____.
   a. apoptosis b. mitosis c. meiosis d. initiation of tumors.

**Q.2 b. Give an account on the following questions: (Any Two)** **14**

1. Autocrine, and paracrine signaling molecules with suitable examples for each.
2. Structure of G protein-coupled receptors with the help of a neat diagram.
3. JAK-STAT signaling pathway with the help of a neat diagram.

**Q.3 a. Select the correct alternative (Any six)** **06**

1. The Fertilized egg cell is also called a _____.
   a. Gamete b. Blastula c. Morula d. Zygote
2. Morphogenic movement_____ involves the local inward buckling of an epithelium.
   a. Epiboly b. Involution c. Invagination d. delamination
3. Which one of the following is the source of embryonic stem cell
   a. Heart b. Stomach c. Inner cell mass d. Gastrula

4. The mouse is a preferred model organism in developmental biology because:
   a. It is the closest mammalian model organism to humans.
   b. Option model organism should have huge adult size
   c. Model organisms should not be easily available.
   d. Model organisms should be expensive.

5. _____is NOT a derivative of the endoderm germ layer.
   a. Gut tube b. bone c. Thymus d. Lung

6. _____ are special molecules which play a very important role during oocyte maturation, in the female's ovary.
   a. Fate map b. ICM c. Cytoplasmic determinants
   d. nuclear determinants

7. Select 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.

8. Which one of the following is an artificial marking technique used in the construction of a fate map?
   a. Ziel-Nielson carbol fuchsin staining b. Vital staining
   c. Gram staining d. Capsule staining

9. _____ will form placenta and extra-embryonic tissues embryo.
   a. Inner cell mass b. Trophoblast c. Gastrula d. Notochord

**Q.3 b. Discuss the following: (Any Two)** **14**

1. Importance of model organisms in developmental biology.
2. Fate map: Construction and uses.
3. Overview of Developmental biology and contribution of various disciplines in the emergence of developmental biology.

**Q.4 a. Select the correct alternative: (Any six)** **06**

1. _____ are cancers arising from epithelial cells.
   a. Carcinoma b. Sarcoma c. Chondrosarcoma d. Leukemia
2. Cells defective in _____escape apoptosis and promotes cancer.
   a. p53 b. gp120 c. Rb d. CA-125
3. Genes that encode proteins that inhibit excessive cell proliferation are called _____ .
   a. tumor suppressor genes b. tumor enhancer genes
   c. activator genes d. progenitor genes

4. In _____, there is the formation of new blood vessels for a tumor to ensure adequate blood supply to get sufficient oxygen and nutrients.
   a. tumor progression b. angiogenesis c. adenoma d. embryogenesis
5. _____ is associated with liver cancer or hepatocellular carcinoma.
   a. TMV virusb.EBV virus c. Hepatitis virus d. HIV
6. _____ is a chemotherapeutic drug that binds to abnormal proteins in cancer cells, blocking their action.
   a. Gleevec b. streptomycin c. Kanamycin d. fansidar
7. _____ genes are mutated in a wide range of human cancers and are one of the most important examples of cancer-critical genes.
   a. Ras b. Tas c. CA-125 d. Bcl-2
8. Rb gene is a _____ gene.
   a. tumor suppressor b. tumor stimulator
   c. apoptotic d. metastatic
9. Penetration of cell into a blood vessel and the exit of the same elsewhere in the body to grow in a new site forming a small clump at first before metastasis is called _____.
   a. angiogenesis b. morphogenesis c. micro-metastasis d. metastasis

**Q.4 b. Describe the following questions: (Any Two) 14**

1. Cancer cells are a clone descended from a single abnormal cell.
2. Role of p53 in controlling cancer.
3. Various cancer treatments.

**Q.5 Write Short notes on the following: (Any four) 20**

**a.** Caspases and their targets.
**b.** Role of Growth Factors in the proliferation of Mammalian Cells.
**c.** Computer-based Neural Networks.
**d.** Slow adaptation.
**e.** Cytoplasmic determinants.
**f.** Role of viruses in cancer.

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