

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. Explain the following terms: (Any six) 06

1. Restriction point.
2. Interphase.
3. Growth factors.
4. Cell senescence.
5. Apoptosome.
6. Necrosis.
7. Binary fission.
8. M phase.
9. Cleavage divisions.

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

1. Elaborate on the role of yeasts in the study of cell cycle based on following points
 - a. Budding and fission yeasts.
 - b. Check points, Genes and MPF in yeast cell cycle.
2. With reference to the early embryonic cell cycle and the role of MPF discuss-
 - a. Two Differences in Early embryonic cell cycle and standard cell cycle.
 - b. MPF- Experimental evidences as a cytoplasmic regulator and oscillations in MPF activity.
3. What is Apoptosis? Explain receptor mediated pathway of apoptosis.

Q.2 a. Do as instructed: (Any six) 06

1. What is a SH2 domain?
2. What do you mean by contact dependent signalling?
3. Name any one class of G proteins.
4. Name any one layer in a simple neural network.

5. Fill in the blank: Kinases are enzymes which add a _____ molecule to its substrate (cytokinin, phosphate, cytokine)
6. Give an example of an endogenous opiate.
7. Give an example of a ligand.
8. State true or False: Endocrine signalling involves secretion of signal molecules called hormones.
9. State true or False: Ba^{++} is a second messenger.

Q.2 b. Explain the following questions: (Any Two) 14

1. Use of computer based networks in understanding complex cell signalling pathways.
2. Second messengers with the help of two examples.
3. Signal transduction pathway of GPCR's with a diagram.

Q.3 a. Do as directed: (Any Six) 06

1. What is a blastula?
2. State true or False: Cell potency describes the entire repertoire of cell types a particular cell can give rise in all possible environments.
3. Fill in the blank: _____ is the source of Embryonic stem cells.
4. Define Morphogen.
5. What is differential gene expression?
6. What is regulative development?
7. Explain Fate Map.
8. Name any one method of constructing a Fate map.
9. What is embryonic induction in developmental biology?

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

1. With reference to developmental biology:
 - a. Concept and Overview of developmental biology.
 - b. Contribution of various disciplines in emergence of developmental biology.
2. With reference to gastrulation:
 - a. Types of cellular movements.
 - b. Germ layers and their derivatives.

3. With reference to developmental biology:
 - a. Pattern formation.
 - b. Cytoplasmic determinants.

Q.4 a. Explain the following: (Any six)

06

1. Benign tumour.
2. Sarcoma.
3. Cancer critical genes.
4. Tumour suppressor genes.
5. CdKs.
6. Adenocarcinoma.
7. Angiogenesis.
8. Tumour marker.
9. Lymphoma.

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

14

1. Elaborate on tumour progression.
2. Discuss the role of Rb gene and how its mutations contribute to cancer.
3. Give an account of chemotherapy used for cancer treatment.

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

20

- a. Caspases- Concept and its targets.
- b. Autophosphorylation.
- c. Target cell adaptation.
- d. Any one model organism in developmental biology.
- e. Metastasis- Concept and steps in metastasis
- f. Role of viruses in cancer.