

M. Sc. Biotechnology
FIRST SEMESTER
CELL AND DEVELOPMENTAL BIOLOGY
MBT - 101

Duration: 3 Hrs.

Marks: 70

PART : A (OBJECTIVE) = 20
PART : B (DESCRIPTIVE) = 50

[PART-B : Descriptive]

Duration: 2 Hrs. 40 Mins.

Marks: 50

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

1. In tissue regeneration, what are the consecutive steps followed after the injury or insult? What are the hormonal controls that take place in the metamorphosis of amphibians? 5+5=10
2. What do you mean by cell cycle? Write in detail about the regulatory mechanism of cell cycle. 3+7=10
3. Explain the structure of plasma membrane. Write a note on the chemical composition of plasma membrane. 4+6=10
4. What is the Extracellular Matrix? Explain briefly. What is collagen? Discuss its structure? 2+3+2+3=10
5. What do you understand by cell signaling? What are the different types of cell signals. Explain? 3+7=10
6. What is homeotic gene expression? What are the hierarchy of genes in Drosophila development? 3+7=10
7. Explain the major characteristics of stem cells. How "Embryonic" stems differ from "Adult stem cells"? What are the potential uses of stem cells? 3+3+4=10
8. Explain the molecular mechanism of mating-type switch in yeast development. How Self and non-self is determined in the reproductive biology of Plants? 4+6=10

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[PART-A : Objective]

Choose the correct answer from the following :

1×20=20

1. In facilitated diffusioncan be seen
 - a. ATP dephosphorylation
 - b. Conformational change of the protein
 - c. ATP phosphorylation
 - d. Movement of solvent
2. The sequence of the cell cycle is.....
 - a. G1/S/G2/M
 - b. G1/G2/S/M
 - c. S/G1/G2/M
 - d. G2/G1/S/M
3. Mitosis is similar to
 - a. Equational division
 - b. Meiosis I
 - c. Meiosis II
 - d. Both a and c
4. MPF regulates checkpoint of cell cycle.
 - a. START
 - b. Restriction point
 - c. Third
 - d. First
5.Sodium ions are allowed to go outside the membrane through Na-K pump
 - a. 4
 - b. 5
 - c. 2
 - d. 3
6. The nuclear envelope contains how many nuclear membranes
 - a. 3
 - b. 2
 - c. 4
 - d. 1
7. The chromatin becomes highly condensed during
 - a. Mitosis
 - b. Meiosis
 - c. Cell division
 - d. Relication
8. Cells of multicellular animals are embedded in
 - a. Tissues
 - b. Extracellular Matrix
 - c. Intermediate filaments
 - d. Cytoplasm
9. Which is the major structural protein of the extracellular matrix
 - a. Keratin
 - b. Dentine
 - c. Haemoglobin
 - d. Collagen
10. The triple helix domain of collagens consists of the which sequence
 - a. Ala-X-Y
 - b. Gly-X-Y
 - c. Leu-C-T
 - d. Pro-G=C
11. In developmental biology, what is meant by the concept of "growth"?
 - a. Growth occurs through increases in cell size and number.
 - b. Growth can result from increases in the volume of extracellular matrix.
 - c. Cell death is a critical determinant of overall growth.
 - d. All of the above mechanisms by which growth occurs.
12. Is there a difference between oncogenes and tumor suppressor genes?
 - a. Yes, oncogenes are genes that can cause cancer when they become mutated to become proto-oncogenes, whereas tumor suppressor genes play no role in cancer.
 - b. Yes, oncogenes prevent cancer from forming unless they are mutated, whereas tumor suppressor genes stimulate the formation of cancer even in the absence of mutation.
 - c. Yes, oncogenes are mutated versions of genes that promote abnormal cell division, whereas tumor suppressor genes are genes that normally hold cell division in check when it is not appropriate.
 - d. No, since both types of genes contribute to the development of cancer, there is no difference between them.
13. Insects such as Drosophila undergo three molts before becoming a pupa and undergoing metamorphosis. Molting, which is also called 'ecdysis', is controlled by what hormone?
 - a. Ecdysone
 - b. Juvenile hormone
 - c. Cytokinin
 - d. Growth hormone
14. Metamorphosis of amphibians is triggered by environmental cues that act on the:
 - a. thyroid
 - b. pituitary
 - c. hypothalamus
 - d. eye

15. Puberty is initiated by pulse release of
- Somatostatin
 - Gonadotropin-releasing hormone
 - Growth hormone-releasing hormone
 - Growth hormone
16. A fertilized egg is called a :
- embryo
 - zygote
 - blastula
 - germ cell
17. The process by which developing cells achieve their functional, mature identity as liver, or muscle, or nerve is called:
- cleavage division
 - pattern formation
 - morphogenesis
 - differentiation
18. Which one of the following genes was NOT part of transcription factors used to generate iPS cells from mouse skin fibroblasts?
- Oct4
 - Sox2
 - C-jun
 - c-myc
19. What is the role of stem cells with regard to the function of adult tissues and organs?
- Stem cells are determined cells that reside in fully differentiated tissues and can, when needed, differentiate to supply new cells for growth of the tissue.
 - Stem cells are undifferentiated cells that divide giving rise to one stem cell and one daughter that differentiate to replace worn out cells in the adult tissue.
 - Stem cells are specialized cells that have yet to express the genes characteristics of their differentiated states, and do so when needed for repair of tissues.
 - Stem cells are embryonic cells that persist in the adult, and can give rise to all kinds of cell types in the body.
20. As mammalian zygotes divide, all cells are totipotent up to thecelled stage.
- 2
 - 4
 - 6
 - 8

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UNIVERSITY OF SCIENCE & TECHNOLOGY, MEGHALAYA



[PART (A) : OBJECTIVE]

Duration : 20 Minutes

Serial no. of the
main Answer sheet

Course :

Semester : Roll No :

Enrollment No : Course code :

Course Title :

Session : 2017-18 Date :

Instructions / Guidelines

- The paper contains twenty (20) / ten (10) questions.
- Students shall tick (✓) the correct answer.
- No marks shall be given for overwrite / erasing.
- Students have to submit the Objective Part (Part-A) to the invigilator just after completion of the allotted time from the starting of examination.

Full Marks	Marks Obtained
20	

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Scrutinizer's Signature

.....
Examiner's Signature

.....
Invigilator's Signature