

B.Sc.-M.Sc. INTEGRATED PROGRAMME (CHEMISTRY)

SEMESTER III Examination 2019

PAPER CODE - BCH GE 3

PAPER TITLE: DEVELOPMENTAL BIOLOGY

(Write your Roll No. at the top immediately on the receipt of this question paper)

Time: Three Hours

Maximum Marks: 75

Attempt ALL questions. All parts of a question must be answered in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary.

Question 1: Attempt all

A. Explain briefly:

5x1=5

- i. Somitogenesis
- ii. Reciprocal induction
- iii. Competence
- iv. Role of Phospholipase C in fertilized egg
- v. Sperm Capacitation

B. Fill in the blanks:

5x1=5

- i. Eggs that contains negligible amount of yolk are called _____.
- ii. Blastulae produced by spiral cleavage typically have very small or no blastocoel and are called _____.
- iii. Epithelial to mesenchymal transition involves usually _____ type of morphogenetic movement.
- iv. _____ specification predominates in most insect classes.
- v. Yamanaka factors include master regulator transcription factors like _____.

C. State True or false:

5x1=5

- i. During cleavage, the cell cycle consists primarily of the G1 and G2 phase.
- ii. Histone acetyltransferases stabilize nucleosomes to become heterochromatic.
- iii. Liver develops from mesoderm.
- iv. *Caenorhabditis elegans* exhibits meroblastic cleavage.
- v. Lining of thoracic and abdominal cavities originates from endoderm.

Question 2: Attempt any three of the following:

3x5=15

- A. What was role of Preformationists and Epigenesists in progress of developmental biology?
- B. Explain the process of Spermatogenesis. Tabulate the difference with the process of Oogenesis.
- C. Describe the process of Acrosome reaction during external fertilization. How is this process different during internal fertilization?
- D. What prevents polysepermy during external and internal fertilization?
- E. Explain the role of calcium in activation of gametes and process of fertilization thereafter.

Question 3: Attempt **any three** of the following:

3x5=15

- A. Describe significance of the process of blastulation. What are different types of cleavage observed during this process?
- B. Compare the cleavage pattern observed in amphibians and mammals. What is process of compaction?
- C. What is gastrulation? Explain and draw representative stages of mammalian gastrulation process.
- D. Explain various morphogenetic movement of cells during the process of gastrulation.
- E. Describe briefly various techniques that can be used to trace tissues and cell types back to their origins in the embryo.

Question 4: Attempt **any three** of the following:

3x5=15

- A. What are various overt stages a cell goes through to achieve differentiation. Describe the process of autonomous and conditional specification.
- B. How distribution of cytoplasmic factors in a cell determines the fate of a syncytium. Cite an example.
- C. What is genomic equivalence? Cite the observations that prove it.
- D. Explain briefly how gene expression is regulated at different levels in a cell.
- E. Describe how microRNA regulate mRNA translation.

Question 5: Attempt **any three** of the following:

3x5=15

- A. Write a note on development of vertebrate eye by the process of induction.
- B. Which three ectodermal regions are made physically and functionally distinct from one another during neurulation? Explain role of each.
- C. Explain the process of formation of central and peripheral nervous system.
- D. Designate the origin of various organs and tissues in body from different germ layers.
- E. What are extra embryonic membranes and their role? How placenta develops in mammals?

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