



VIT
Vellore Institute of Technology

Final Assessment Test – April 2025

Course: TBIT209L - Developmental Biology

Class NBR(s): 1300 / 1302

Time: Three Hours

Slot: F1+TF1

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions
(10 X 10 = 100 Marks)

1. Compare and contrast between 'spermatogenesis and 'spermiogenesis'.
2. Compare the disadvantages and benefits (if any) of polyspermy. Discuss the mechanisms employed to prevent polyspermy in mammals.
3. Describe the process of germ layer formation in mammalian embryo. Outline the roles of trophoblast and epiblast cells during the germ layer formation.
4. Explain the term "transitional blastoderm" in the context of Drosophila embryonic development. Discuss its salient features. Draw and identify the presumptive germ layers in a pre-gastrulation Drosophila embryo.
5. Explain with examples, how differential gene expression is caused by a) DNA methylation and, b) mRNA adenylation.
6. Summarize the role of bicoid, hunchback, nanos and caudal protein in the anterior-posterior axis determination. Elucidate with the help of neat diagrams.
7. Explain the roles of Snail and Pitx2 proteins in left-right axis determination in vertebrates. In addition, summarize the importance of ciliary motion in the nodal cells for LR-axis determination. Elucidate with the help of neat diagrams.
8. With the help of neat diagrams summarize the process of brain development in vertebrates.
- 9.a) Elaborate the structure of a bipotential gonad. Discuss, how Y-chromosome is responsible for specifying the male phenotype in mammals.

OR

- 9.b) Discuss the commonality between the sex determination process in certain reptiles, *Bonellia viridis* larva, and sea snails (*Crepidula sp.*).

- 10.a) Outline the techniques that are used to identify differential gene expression. Elucidate with the help of neat diagrams.

OR

- 10.b) Discuss the applications of whole mount microscopy techniques in embryology. Elucidate with the help of neat diagrams.

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