5. (a) Explain salamander limb regeneration. 5

(b) Discuss insect imaginal discs as organizing centers in the development of appendages and organs. 10

6. (a) Illustrate homeobox genes and their role in pattern formation. 7

(b) Provide a comprehensive account of testosterone and estrogen biosynthesis. 8

7. Describe the histology and functions of endocrine glands named pituitary, thyroid and pancreas. 15

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May 2026

M.Sc. (Zoology) (Fourth Semester)

Developmental Biology (ZOP-202-V)

Time : 3 Hours] [*Maximum Marks : 75*

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a) How does zebrafish serve as a model for real-time developmental analysis ? 1.5

(b) Define cell differentiation and state one molecular basis underlying it. 1.5

(c) What role does regulated cell division play in early embryogenesis ? 1.5

(d) What is the significance of blastula formation ? 1.5

(e) Define cleavage and state its significance in early development. 1.5

(f) Define epimorphic regeneration with an example. 1.5

(g) Why is aging considered a genetically regulated process ? 1.5

(h) What role do growth hormones play in postembryonic development ? 1.5

(i) What endocrine changes initiate lactation ? 1.5

(j) Distinguish estrous cycle from menstrual cycle. 1.5

Part B

2. (a) Describe *Xenopus laevis* as a model organism for studying vertebrate development. 8

(b) Explain cell differentiation and fate determination during development. 7

3. (a) Discuss the concept of pattern formation with reference to morphogen gradients. 7

(b) Write an account of neural tube formation in vertebrates. 8

4. (a) Elaborate axis specification in *Drosophila* with reference to maternal effect genes and zygotic genes. 10

(b) Describe gastrulation movements and their significance. 5