

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025**

**Subject Code: 3170415**

**Date: 01-12-2025**

**Subject Name: Developmental Biology**

**Time: 10:30 AM TO 01:00 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

|                                                                                                                                           | <b>Marks</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1 (a)</b> Define Specification and Determination in the context of cell fate.                                                        | <b>03</b>    |
| <b>(b)</b> List and briefly describe the three germ layers formed during animal development.                                              | <b>04</b>    |
| <b>(c)</b> Evaluate the role of Genomic Equivalence and Cytoplasmic Determinants in early development.                                    | <b>07</b>    |
| <b>Q.2 (a)</b> Name the four major concepts involved in the process of Induction.                                                         | <b>03</b>    |
| <b>(b)</b> Differentiate between Cleavage and Gastrulation in animal embryogenesis.                                                       | <b>04</b>    |
| <b>(c)</b> Describe the process of Double Fertilization in plants and state its products.                                                 | <b>07</b>    |
| <b>OR</b>                                                                                                                                 |              |
| <b>(c)</b> Analyze the molecular and cellular events of sperm-egg recognition in animals.                                                 | <b>07</b>    |
| <b>Q.3 (a)</b> What is a Floral Meristem? State its primary function.                                                                     | <b>03</b>    |
| <b>(b)</b> Explain the concept of Developmental Mutants and their significance in developmental biology.                                  | <b>04</b>    |
| <b>(c)</b> Describe the process of Limb Organogenesis in vertebrates.                                                                     | <b>07</b>    |
| <b>OR</b>                                                                                                                                 |              |
| <b>(a)</b> Define Imprinting in the context of development.                                                                               | <b>03</b>    |
| <b>(b)</b> Analyze the steps and key regulatory events of Sex determination in humans.                                                    | <b>04</b>    |
| <b>(c)</b> Apply the concept of Morphogenetic gradients to explain the pattern formation along the anterior-posterior axis in Drosophila. | <b>07</b>    |
| <b>Q.4 (a)</b> Give two examples of Post Embryonic Development in animals.                                                                | <b>03</b>    |
| <b>(b)</b> Briefly explain the Organization of the Shoot Apical Meristem (SAM) in plants.                                                 | <b>04</b>    |
| <b>(c)</b> Evaluate the critical role of Cell Communication (signaling) in promoting the development of a multicellular organism.         | <b>07</b>    |
| <b>OR</b>                                                                                                                                 |              |
| <b>(a)</b> Describe Cell Aggregation and Differentiation in the slime mold Dictyostelium.                                                 | <b>03</b>    |

- (b) List the key stages of Embryo sac development in plants. **04**
- (c) Explain the difference between Stem cells and committed cells. **07**
- Q.5** (a) Analyze the process of leaf development and the establishment of phyllotaxy in plants. **03**
- (b) Define Senescence and Aging in a biological context. **04**
- (c) Evaluate the significance of Programmed Cell Death (PCD) in normal development and organogenesis. **07**

**OR**

- (a) What is the difference between a Stem Cell and a Differentiated Cell? **03**
- (b) Explain how the external environment can influence the normal developmental process. **04**
- (c) Evaluate the conservation of molecular and cellular principles across different species in developmental biology. **07**

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