18052

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – M.Sc.(BT)-2024
Course Name – Developmental Biology
Course Code - MBT30209
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Which factor provides positional information during embryonic development?
a) Stem cells b) Morphogenetic gradients
c) Cell adhesion molecules d) Zygote

(ii) What does genomic equivalence imply?
a) Presence of different genes b) Same genome in all cells
c) Genes vary by cell type d) Different RNA in cells

(iii) Irreversible commitment of a cell is called:
a) Competence b) Induction
c) Determination d) Specification

(iv) Differentiation leads to:
a) Dedifferentiation b) Increased totipotency
c) Functional specialization d) Loss of DNA

(v) Differentiate between oogenesis and spermatogenesis in terms of meiotic divisions.
a) Oogenesis has equal divisions b) Spermatogenesis skips meiosis I
c) Oogenesis has unequal cytoplasmic divisions d) Both have identical patterns

(vi) Determine which structure contains the female gametophyte in flowering plants.
a) Ovule b) Ovary
c) Embryo sac d) Micropyle

(vii) Apply knowledge to identify a plant-specific process involving two sperm cells.
a) Parthenogenesis b) Double fertilization
c) Polyembryony d) Apomixis

(viii) Determine the origin of the archenteron during gastrulation.
a) Blastocoel b) Blastopore
c) Primitive streak d) Chorion

(ix) Differentiate between anterior and posterior axis formation in Drosophila.

a) Posterior formed by bicoid
b) Anterior formed by nanos
c) Anterior by bicoid; posterior by nanos
d) Both by gap genes

(x) Evaluate the function of BMP in ectodermal differentiation.

a) Induces neurons
b) Blocks epidermis
c) Promotes epidermis; BMP inhibition promotes neurons
d) Forms gut

(xi) What does phyllotaxy refer to?

a) Leaf shape
b) Leaf pigment
c) Leaf arrangement
d) Leaf thickness

(xii) Identify the male reproductive organ in flowers.

a) Petal
b) Stamen
c) Carpel
d) Ovary

(xiii) Which gene maintains stem cell population in SAM?

a) FT
b) AG
c) WUSCHEL
d) SOC1

(xiv) Which gene regulates the termination of floral meristem in Arabidopsis?

a) LEAFY
b) WUSCHEL
c) TFL1
d) SEPALLATA

(xv) Evaluate senescence-associated β-galactosidase staining.

a) Marker of apoptosis
b) Cell viability test
c) Senescence indicator
d) Differentiation marker

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Interpret the significance of genomic equivalence in multicellular organisms. (3)
3. Apply the process of spermatogenesis to explain how sperm cells are formed. (3)
4. Identify the main zones of the root apical meristem. (3)
5. Distinguish between early and late markers of apoptosis. (3)
6. Evaluate the use of chick embryo as a model for studying morphogenesis. (3)

OR

Evaluate how larval structures contribute to post-embryonic development. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Analyze the functional differences between caspase-8 and caspase-9. (5)
8. What is a fate map? Describe at least one method to determine a fate map. (5)
9. Discuss the basic steps to follow in In vitro fertilization (IVF). (5)
10. Estimate the role of Resact protein in the sperm attaction event in Sea urchin. (5)
11. Describe the developmental stages of leaf formation in higher plants. (5)
12. Summerize the importance of syncytical cable formation by primary mesenchyme cells of the sea urchin during early gastrula. (5)

OR

Evaluate the roles of Bicoid, Nanos and Hunchback genes in the anterior posterion axis formation in Drosophila oogenesis. (5)

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