



SCHOOL OF BIO SCIENCES AND TECHNOLOGY
CONTINUOUS ASSESSMENT TEST -II
WINTER SEMESTER 2024-2025

Programme Name & Branch : MSc Biotechnology Integrated
Course Code : TBIT209L
Course Name : Developmental Biology
Slot : F1+TF1
Faculty Name(s) : Debasish Mishra (13735), Devi Rajeswari V. (10601)
Class Number(s) : VL2024250501302/ 1300
Date of Examination : 21/03/2025
Exam Duration : 90 minutes

Maximum Marks: 50

General instruction(s): *Answer all questions. **Read the questions carefully before answering. ***Use neat diagrams to support your answers. **** You are allowed to refer to notes and study materials while answering the questions.

- | Q. No. | Questions | Marks |
|--------|--|-------|
| 1. | Identify the gene expression outcomes in an embryo in the following cases (any FOUR): a) One of the histone protein winding the respective gene is methylated, b) enhancer is methylated, c) absence of gene promotor, d) loss of function mutation in the transcription factor, e) presence and absence of super-enhancers. Explain the effects with one or more fitting examples and neat diagrams. [2.5+2.5+2.5+2.5 marks] | 10 |
| 2. | Differential gene expression could result from post-transcriptional changes in the mRNA. Discuss, differential gene expressions that could be caused by: a) differential splicing, and b) polyadenylation of mRNA. Explain with fitting examples and neat illustrations. [5 + 5 marks] | 10 |
| 3. | The figure (a) shows, how a normal Drosophila embryo develops to a normal larva. The figure also highlights the body plan of a normal Drosophila larva. However, figure (b) and (c) shows some experimental interventions in a normal (wild type) Drosophila embryos. The experiments were in fact part of the Nobel prize winning work of Nusslein-Volhard. Your job will be to predict the outcomes of the experiments (b) and (c). Explain your prediction thoroughly with sufficient reasons and neat illustrations. [5 + 5 marks] | 10 |
| 4. | During the dorso-ventral (DV) axis determination process in Drosophila embryo, enlist the proteins (in the ventral follicular cells) that specifically get fragmented to transform into active states. Summarize the conditions that can 'dorsalize' a Drosophila embryo. (Hint: Dorsalization means appearance of dorsal features only and absence of ventral features in an embryo) [5 + 5 marks] | 10 |
| 5. | Outline the possible reason of randomization of visceral organs. Identify the role of 'Pitx2' and 'Snail' proteins in placing the visceral organs correctly in mammalian embryos. [5 + 5 marks] | 10 |

