

COURSE CODE (CREDITS): 25B11BT312 (3-1-0)

MAX. MARKS: 35

COURSE NAME: GENETICS AND DEVELOPMENTAL BIOLOGY

COURSE INSTRUCTORS: Dr Sudhir Syal / Dr Tyson

MAX. TIME: 2 Hours

*Note: (a) All questions are compulsory.**(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

Q.No	Question	CO	Marks
Q1	Early embryonic development in Drosophila depends on maternal genes laid down before fertilization. Describe the molecular interactions that help establish the axis determination in Drosophila.	II	4
Q2	During early avian development, major cell movements reorganize the embryo into distinct germ layers. Outline the events that lead to the formation of primitive streak.	II	4
Q3	Some vertebrates (Salamander) are capable of restoring complex structures (limb) after injury. a) Explain the cellular processes that occur at the wound site leading to new tissue formation. b) Describe the factors that regulate the continued growth and maintenance of the regenerating structure.	II	3+3
Q4	In some organs (Liver), restoration of function occurs without reconstructing the exact original structure. Explain how surviving cells respond following partial removal of such an organ.	II	3
Q5	Explain the sequential cellular events involved in human gametogenesis, highlighting how spermatogenesis and oogenesis differ in their timing, meiotic progression and final gamete output.	II	3
Q6	A. Do you think mutation rates in humans differ between genders? Justify scientific arguments to support your answer. B. Explain why dominant mutations can be detected during a genetic screen. C. Analyze why haploid organisms provide significant advantage for detecting mutant phenotypes compared to diploids?	IV	2+2+1
Q7	a) How do we know that in humans the X-chromosome plays no role in sex-differentiation? Why do 15% of the genes on X chromosome escape inactivation? b) Analyze the role of Lyon hypothesis in humans and explain its principles.	I	2.5+2.5

Q8

a) Differentiate between the inheritance pattern determined by multiple genes and by multiple alleles.
b) Study the following pedigree and find out the pattern of inheritance and genotypes of each individual giving reasons.

III

2.5+2.5

