JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2025

B.Tech-III Semester (BT)

COURSE CODE (CREDITS): 25B11BT312/ 18B11BT311 (3-1-0) MAX. MARKS: 25

COURSE NAME: GENETICS AND DEVELOPMENTAL BIOLOGY

COURSE INSTRUCTORS: Dr Sudhir Syal / Dr Tyson MAX. TIME: 1 Hour 30 Min

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	a) A disease which is due to recessive allele that is lethal when homozygous occurs 2 in one million in a specific population. How many individuals in a town with a population of 22,000 can be expected to carry this allele? b) One child in 5000 is born with an autosomal recessive disorder. Calculate the frequency of this mutant allele in population.	III	2+2
Q2	a.) Barbara McClintock studied potential genetic linkage in corn (*Zea mays*) for genes controlling kernel color (colored is dominant to colorless) and endosperm composition (starchy is dominant to sugary). McClintock performed two crosses. In the first cross, pure-breeding colored (CC), starchy-kernel (SS) plants were crossed to plants pure-breeding for colorless (cc), sugary (ss) kernels. The F_1 of this cross were test-crossed to colorless (cc), and sugary (ss) plants. The test-cross progeny were as follows: Phenotype Number Colored, starchy 750 Colorless, sugary 734 Colored, sugary 18 Colorless, starchy 22 Calculate the recombination frequency and linkage status of these two genes. b.) How will you calculate distance between two genes?	III	3+1
Q3	a) During crossing over true exchange happens, explain with the help of experiment that proved physical basis of crossing over. b) How the Chromosomal theory of Inheritance is linked to Mendel's law.	I	2+2
Q4	Explain the key events during amphibian gastrulation and explain how they contribute to the formation of the germ layers.	II	4

Q5	Compare the cleavage patterns in mammals and amphibians discussing how the amount and distribution of yolk influences the process.	II	2
Q6	Gastrulation involves morphogenetic movements that reorganize the embryo to establish the three germ layers and body axes. Describe the different morphogenetic movements during gastrulation.	II	3
Q7	Cell specification and cell potency are critical mechanisms that govern the developmental potential and fate of embryonic cells. a) Explain the different types of cell specification and how they contribute to establishing cellular diversity during early embryogenesis. b) Discuss the significance of cell potency in embryonic development.	II	3+1