COURSE CODE: 10B11BT411   MAX. MARKS: 25

COURSE NAME: Genetics

COURSE CREDITS: 04   MAX. TIME: 1.5 hrs.

Note: *All questions are compulsory; Carrying of mobile phone during examination will be treated as case of unfair means.*

Q1. In Drosophila, a cross was made between females – all expressing the three x-linked recessive traits scute bristles (sc), sable body (s), and vermilion eyes (v) – and wild type males. In the F_1, all females were wild type, while all males expressed all three mutant traits. The cross was carried to F_2 generation, and 1000 offspring were counted, with the following results:-

Phenotype			Offspring
sc	s	v	314
+	+	+	280
+	s	v	150
sc	+	+	156
sc	+	v	46
+	s	+	30
sc	s	+	10
+	+	v	14

a) Determine the genotypes of P_1 and F_1 parents. b) Determine the sequence of three genes and map distances between them c) Are there more or fewer double crossovers than expected? d) Calculate the coefficient of coincidence. Does it represent positive or negative interference?   **COII (5)**

Q2: i) How do mammals, including humans solve the dosage problem caused by the presence of an X and Y chromosome in one sex and two sex chromosomes in the other sex?

ii) Describe how non-disjunction in human female gametes can give rise to Klinefelter and Turner Syndrome offspring following fertilization by a normal male gamete.

iii) Explain why a 50% recovery of single crossovers products is the upper limit, even when crossing over always occurs between two linked genes.   **COIII (2+2+1)**

Q3: i) Differentiate among Meristic, Continuous, and Threshold traits giving at least one example for each.

ii) The following table shows distribution of F_1 and F_2 progeny derived from a theoretical cross involving guavas:-

	Weight (grams)					
	60	70	75	100	120	150
No. of F1			6	10	18	
No. of F2	0	5	7	12	16	12

What are the means, variance, and standard deviation for F_1 and F_2?   **COIV (2+3)**

PTO

Q4: i) A wheat variety with red kernals (genotype AABB) was crossed with a variety with white kernals (aabb). The F_1 plants were intercrossed to produce F_2. If each dominant allele increases the amount of pigment in the kernel by equal amount, what phenotypes would be expected in F_2?

ii) In a plant species height is determined by four independently assorting genes, A, B, C, and D. Each dominant allele contributes 01 cm to the basic stalk height of 10 cm (aabbccdd). a)What is phenotype of the plant (in terms of height) AaBbCcDd? b) If this plant is selfed, what fraction of its offspring will be 10 cm tall?

iii) How do we know that specific genes are located on the sex determining chromosomes rather than on autosomes? **CO II & IV (2+2+1)**

Q5: i) What are the assumptions and consequences of the Hardy-Weinberg Law?

ii) Explain the phenomenon of Incomplete dominance by giving an example.

CO I & III (2.5+2.5)