JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATIONS-2022

M.Sc.-I Semester (BT)

COURSE CODE (CREDITS): 20MS1BT115 (2) MAX. MARKS: 15

COURSE NAME: Genetics

COURSE INSTRUCTORS: Prof. Sudhir Kumar MAX. TIME: 1 Hour

Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1: A) Why an Operon is called as functioning unit of genomic DNA?

B) George Udny Yule was wrong in suggesting that an autosomal dominant trait like brachydacyly will increase in frequency in populations. Explain why Yule was incorrect?

[1.5+1.5]

Q2: A) Outline the notion of pangenesis and explain how it differs from the germ-plasm theory?

B) If parents were known to be carrier for albinism. What is the chance of the following: - all four normal children, and three normal and one albino? [1.5+1.5]

Q3: ABO blood group types were examined in a population, and allelic frequencies were determined as A – 0.30, B – 0.15, O – 0.55. Assuming Hardy-Weinberg conditions apply, what are the frequencies of genotypes, and what are the blood group frequencies in this population? [3]

Q4: A) The ability to taste Phenylthiocarbaminde is an autosomal dominant trait. The inability to taste it is a recessive condition. In a sample of 500 people, 360 have the ability to taste it and 140 do not. Calculate the frequency of a) recessive allele b) the dominant allele c) carriers.

B) What are the steps to develop and validate a model specifically related to Genetics? [2+1]

Q5. A) An inbred strain of plants has a mean height of 24 cm. A second strain of the same species also has a mean height of 24 cm. These were crossed and all F1 plants were of same height as the parent plants. However F2 plants show a wide range of heights; the majority are like P1 and F1 plants, but approximately 4 of 1000 are only 12 cm high, and about 4 of 1000 are 36 cm high. i) How many gene pairs are involved? Indicate the possible genotypes that could account for F2 plants of 18 cm height? ii) How much does each gene pair contribute to plant height?

B) What is the significance of QTL analysis in food quality and production? [2+1]