

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech.-III Semester (BT)

COURSE CODE (CREDITS): 18B11BT311 (04)

MAX. MARKS: 25

COURSE NAME: Genetics

COURSE INSTRUCTOR: Prof. Sudhir Kumar

MAX. TIME: 1 Hour 30 Minutes

*Note: (a) All questions are compulsory. You may use calculator.*

*(b) Marks are indicated against each question in square brackets.*

Q1:- a) The frequency of newborn infants homozygous for a recessive lethal allele is about 1 in 25,000. What is the expected frequency of the carriers of this allele in the population? (assume random mating).

b) Human beings carrying the dominant allele T can taste the substance phenylthiocarbamide. In a randomly mating population in which the frequency of this allele is 0.4, what is the probability that the particular taster is homozygous?

c) The incidence of recessive albinism is 0.0004 in a human population. What is the frequency of the recessive allele? (assume random mating). CO I [2+2+1]

Q2:- a) You have an individual who is totally heterozygous for 2 genes that are not linked (i.e., not on the same chromosome). One gene is for ear size (AA or Aa being free ear lobes whereas aa is for fused ear lobes) and the other gene is for shallow eye socket (BB and Bb for shallow eye socket whereas bb represents normal eyes). If you testcross this individual, what are the resulting genotypes and phenotypes?

b) A brown-eyed, long-winged fly is mated to a red-eyed, long-winged fly. The progeny are: 51 long, red ; 53 long, brown ; 18 short, red ; 16 short, brown. Using solely the information provided, what are the genotypes of the parents? COIII [2.5+2.5]

Q3:- A sample of 10 plants from a population was measured in inches as follows: 18, 21, 20, 23, 20, 21, 20, 22, 19, and 17. Calculate mean, variance, and standard deviation and how do these values are useful for genetic analysis? COIV [5]

Q4: a) Explain broad sense and narrow sense heritability and its use in quantitative genetics by providing at least one example.

b) Q2: Can a gene have different frequencies in different environments. Justify your answer.

COIII [3+2]

Q5: a) A genotype aabbccddeee enables a plant to attain height of 20 cm. Each dominant gene if replaces a recessive allele adds 2 cms to the height of plant. Assuming independent segregation of each allele pair, Calculate the minimum and maximum height of the F1 plants of a cross:- AABbccDDEe X aabbCCDdEe

b) Differentiate between Meristic and Threshold traits.

CO V [3+2]