

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST – 3 EXAMINATION, MAY-JUNE 2016

## B.TECH II SEMESTER

COURSE CODE: 10B11BT411

MAX. MARKS: 35

COURSE NAME: Genetics

COURSE CREDITS: 03

MAX. TIME: 2 HRS

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

- Q1. a) In a family of 6 children, where both parents are heterozygous for albinism, what mathematical expression predicts the probability that 4 are normal and 2 are albinos?  
 b) A two factor interaction (complementary inheritance) in the progeny of two dihybrid parents produces phenotypes in the ratio of 9:7. If one of the dihybrid parents is test crossed, what phenotypic ratio is expected in the progeny?  
 c) What is the significance of a Linkage map? Show with the help of an example. [2+2+1]
- Q2: a) Calculate the genotypic frequencies for multiple alleles where the frequency of alleles  $I^A = 0.38$ , allele  $I^B = 0.11$ , allele  $I^O = 0.51$ .  
 b) A genotype aabbccdde enables a plant attain a height of 20 cm. Each dominant gene replaces a recessive allele adds 2 cm to the height of the plant. Assuming independent segregation of each allelic pair, answer the following queries based upon the cross:- AABbccDDEe X aabbCCDdEe  
 i) What is the height of the parents?  
 ii) What is the height of the tallest and shortest F<sub>1</sub> plant?  
 c) Can you decide whether a trait is controlled by a single pair of alleles or by a number of polygenes simply by observing the F<sub>2</sub> phenotypes of a cross? Explain. [2+2+1]
- Q3: Explain the phenomenon of epistasis (dominant as well as recessive) in the context of gene interaction giving at least one example for each category. [5]
- Q4: a) Predict the result of following crosses for inheritance of Leaf Variegation in *Mirabilis* sp. giving reasons:-  
 i) Female branch (green) X Male branch (white)  
 ii) Female branch (variegated) X Male branch (variegated)  
 iii) Female branch (white) X Male branch (green)  
 b) Predict the results of following cross between snails giving reasons:-  
 Dextral snail female (Dd) X Sinistral snail mail (dd) [3+2]
- Q5: The result shown here were recorded for weight of Tomatoes in ounce.
- |                            |    |    |    |    |    |    |    |
|----------------------------|----|----|----|----|----|----|----|
| Weight (oz.)               | 09 | 10 | 11 | 12 | 13 | 14 | 15 |
| Number of F <sub>1</sub> - |    |    | 15 | 16 | 13 |    |    |
| Number of F <sub>2</sub> - | 00 | 10 | 14 | 15 | 15 | 06 | 03 |
- Calculate mean for F<sub>1</sub> and F<sub>2</sub>, variance and standard deviation and interpret the results. [5]
- Q6: a) Suggest a cross for each by which individuals of XO and XXXY constitution originate  
 b) The fruit fly *Drosophila* is a versatile model organism. Why? [3+2]
- Q7: Explain any two of the following:-  
 a) The origin and propagation of an amphidiploids      b) Neutral and suppressive petites in yeast  
 c) Contribution of Sturtevant in the field of Genetics. [2.5 each]