

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

B.Tech.- III Semester (Biotechnology)

COURSE CODE(CREDITS): 18B11BT311(4)

MAX. MARKS: 15

COURSE NAME: Genetics

COURSE INSTRUCTOR: Prof. Sudhir Kumar

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets. Use of Calculator is allowed.

(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

1. a) In a family of five children, what is the probability that
 - (i) all are males? (ii) three are males and two are females?

The probability of a male child is equal to the probability of a female child ($p = 1/2$).
- b) If a woman is homozygous normal and her husband is heterozygous for a genetically inherited recessive disease; they decide to become parents, what is the probability that they will have a healthy child? **CO I [2+1]**
2. The following are F_2 results of two of Mendel's monohybrid crosses.

(a) Full pods	881
Constricted pods	300
(b) Violet flowers	704
White flowers	225

For each cross, state a null hypothesis to be tested using X^2 analysis. Calculate the X^2 value and determine the p value for both. Interpret the p values. Can the deviation in each case be attributed to chance or not? Which of the two crosses shows a greater amount of deviation?

df	Probability (p)					
	0.90	0.50	0.20	0.05	0.01	0.001
1	0.02	0.46	1.64	3.84	6.64	10.83
2	0.21	1.39	3.22	5.99	9.21	13.82
3	0.58	2.37	4.64	7.82	11.35	16.27

X^2 values

CO I [3]

3. a) What is difference between continuous and discontinuous variations? Explain with the help of an example.
- b) Mendel crossed peas having round green seeds with peas having wrinkled yellow seeds. All F_1 plants had seeds that were round and yellow. Predict the results of testcrossing these F_1 plants. **CO II [1.5+1.5]**
4. a) "Affected man will have affected daughters" Is it a true statement? Support your answer with scientific reasoning. **CO II [2+1]**
- b) Differentiate between Penetrance and Expressivity by giving an example.
5. A normal couple's son is suffering from Huntington' disease (autosomal dominant). Draw the most probable pedigree involving at least three generations (son and siblings, parents, grandparents). You may assume 2-4 siblings – male or female. Use the necessary assumptions to prepare the pedigree. [3] **CO II**