

(c) Why are there more males than females observed with the affected phenotype for an X linked recessive disorder? Explain with a pedigree. (6,6,6)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4111

H

Unique Paper Code : 3182011202

Name of the Paper : Principles of Genetics

Name of the Course : **Bachelor of Science
(Honours Course) Biomedical
Science**

Semester : II

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.'
2. Attempt five questions in all.
3. Question No. 1 is compulsory.
4. Subparts of the questions should be attempted together.
5. Give illustrations and examples wherever required.

1. (a) Define the following terms : (any 3) (3×2=6)

(i) Phenotype

(ii) Back cross

(iii) Auxotroph

(iv) Consanguinity

(b) Differentiate between the following : (any 3)

(3×3=9)

(i) Polymorphism and Mutation

(ii) Incomplete Dominance and Codominance

(iii) G-banding and Q-Banding

(iv) Simple and Composite Transposons

(c) Decipher the chromosomal abnormality and the sex as represented below: (any 3) (3×1=3)

(i) 47, XX, +13

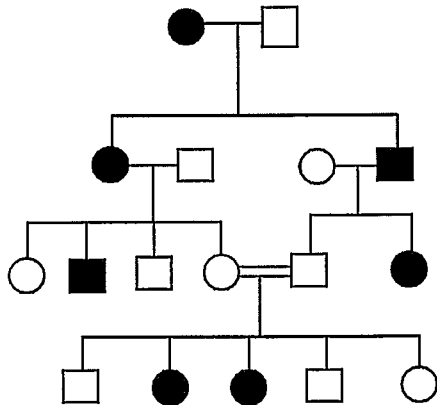
6. (a) A study was carried out by Sonneborn to investigate the mechanism of inheritance of different strains in *Paramecium*. Explain with illustrations.

(b) A woman with type O blood, whose father has type B and whose mother has type A has a child with type O. There is a dispute over the identity of the child's father. Two men are possible fathers. One is type AB and the other is type A. Which man could be the father? What are the genotypes of the woman's parents?

5. (a) How are chromosomes categorised? Discuss different types of chromosomes with illustrations.

(b) Determine the most probable mode of inheritance in the given pedigree. Justify your answer. Explain the significance of pedigree analysis.

(9,9)



(ii) 45, XO

(iii) 47, XXY

(iv) 46, XY, t(9;22)(q34; q11)

2. (a) How do mammals including humans solve the dosage problem caused by the presence of an X and Y chromosome in one sex and two X chromosomes in another sex?

(b) What is sex-limited inheritance? Explain with the help of an example.

(c) How is one metre long DNA packaged into a nucleus of 10 micrometre diameter. Mention different levels of packaging and the packaging ratios.

(5,5,8)

P.T.O.

4111

4

3. Write short notes on : (any 3) (3×6=18)

- (i) Polytene chromosomes
- (ii) Role of environmental factors in sex determination
- (iii) Chromosomal theory of Inheritance
- (iv) Cytoplasmic Male Sterility in Maize

4. (a) Name the gene interaction (genetic effect) and discuss the deviation from Mendelian dihybrid ratio of the following with suitable example :

- (i) 13:3
- (ii) 9:3:4
- (iii) 15:1
- (iv) 12:3:1

4111

5

(b) Chromosome 3 of corn carries three loci (*b* for plant-colour booster, *v* for virescent, and *lg* for liguleless). A testcross of triple recessives with F1 plants heterozygous for the three genes yields progeny having the following genotypes :

305	<i>+</i> <i>v</i> <i>lg</i>
275	<i>b</i> <i>+</i> <i>+</i>
128	<i>b</i> <i>+</i> <i>lg</i>
112	<i>+</i> <i>v</i> <i>+</i>
74	<i>+</i> <i>+</i> <i>lg</i>
66	<i>b</i> <i>v</i> <i>+</i>
22	<i>+</i> <i>+</i> <i>+</i>
18	<i>b</i> <i>v</i> <i>lg</i>

Give the gene sequence on the chromosome and the map distances between genes. (8,10)

P.T.O.