

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 2379

F-4

Your Roll No.....

Unique Paper Code : 2161401

Name of the Course : B.Sc. (Hons.) Botany

Name of the Paper : Concepts of Genetics

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

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. Attempt any **four** questions from the rest.
5. **All** questions carry equal marks.

1. (a) Define the following (**any five**) :

(5×1=5)

(i) Phenocopy

(ii) Robertsonian Translocation

(iii) Pseudodominance

(iv) Pleiotropy

(v) Monosomy

(vi) Tautomeric Shifts

P.T.O.

(b) Match the following (**any five**) : (5×1=5)

- | | |
|---|-------------------|
| (i) CIB Method | Sturtevant |
| (ii) <i>Raphanobrassica</i> | Sutton and Boveri |
| (iii) Chromosomal theory of Inheritance | Karpechenko |
| (iv) Chromosomal Map | H. J. Muller |
| (v) One gene-one enzyme | B. McClintock |
| (vi) Transposable element | Beadel and Tawtum |

(c) Answer **any five** : (5×1=5)

- (i) Name the disease which a new born Rh +ve child of an Rh -ve mother can develop.
- (ii) Name a human trait or disease which skips generation.
- (iii) If a father and son both are defective in green colour vision, is it likely that the son inherited the trait from his father ?
- (iv) Name the organism which was used by Muller for studying induced mutations.
- (v) Name the chemical and its origin used to produce polyploids.
- (vi) Give chromosomal constitution of individuals with Down's syndrome and Klinefelter's syndrome.

2. Differentiate between **any five** : (5×3=15)

- (a) Codominance vs Incomplete dominance
- (b) Somatic mutation vs Germinal mutation
- (c) Back cross vs Test cross
- (d) Penetrance vs Expressivity

- (e) Missense mutation vs Nonsense mutation
- (f) Dominance vs Epistasis
- (g) Deletion vs Duplication
3. (a) What are chemical mutagens ? With suitable examples, explain the molecular basis of mutations caused by **any one** of them. (8)
- (b) Explain the C/B method for detection of mutation in *Drosophila*. (7)
4. (a) Give an illustrated account of the expression and interaction of genes with special reference to the inheritance of the phenotypic ratio; 9:6:1, 9:7 and 13:3. (9)
- (b) Define cytoplasmic / extranuclear inheritance. How does it differ from Mendelian / nuclear inheritance ? (6)
5. (a) Describe briefly the concept of "Multiple Alleles". (3)
- (b) What is pedigree analysis ? Explain autosomal dominant inheritance giving one example. (5)
- (c) What are the different types of gametes that can be produced by individual of the following genotypes :
- | | |
|----------------|-------------|
| (i) AaBb | (ii) AaBB |
| (iii) AaBbCc | (iv) AaBBcc |
| (v) AaBbCcDdEe | (5) |
6. Write short notes on **any five** : (5×3=15)
- (a) Paracentric inversions are crossover suppressor
- (b) Inheritance of Kappa particles in *Paramecium*

- (c) Lethal genes
- (d) *Cis-Trans* Complementation test for functional allelism
- (e) Role of polyploidy in crop evolution
- (f) Polygenic inheritance
- (g) Shell coiling in Snail
7. (a) Give an experimental evidence to prove that crossing over involves exchange of parts between homologous chromosomes. (5)
- (b) From the following test cross data determine the sequence and distance between three loci *cu*, *e*, *st* and calculate the coefficient of coincidence and interference. (10)

Genotype	Number of progeny
<i>cu e st⁺ / cu e st</i>	366
<i>cu⁺ e⁺ st / cu e st</i>	380
<i>cu e st / cu e st</i>	24
<i>cu⁺ e⁺ st⁺ / cu e st</i>	30
<i>cu⁺ e st / cu e st</i>	89
<i>cu e⁺ st⁺ / cu e st</i>	105
<i>cu e⁺ st / cu e st</i>	2
<i>cu⁺ e st⁺ / cu e st</i>	4
Total	1000