(ii) 2X3A

(iii) 1X3A

[This question paper contains 8 printed pages.]

03.01.2024(E)

Your Roll No.....

Sr. No. of Question Paper : 1601 **G**

Unique Paper Code : 2162012303

Name of the Paper : Genetics and Plant Breeding

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

Semester : III

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question No. **1** is compulsory.
4. All parts of a question should be answered together.

1. (a) Define **(any five)** : (5×1=5)

(i) Frameshift mutation

(ii) Pleiotropy

(iii) Trisomy

(iv) Test cross

(v) Heterosis

(vi) Epistasis

(b) Give the important contribution of **(any five)** : (5×1=5)

(i) Carl Correns

(ii) H. J. Muller

(iii) A. Strutevant

(iv) G. H. Hardy and W. Weinberg

(iii) Define coefficient of coincidence and interference. Calculate the value of coefficient of coincidence for the given data. (6)

6. (a) Compare and contrast paracentric inversion with pericentric inversion with the help of suitable diagrams. (7)

(b) A man with type O blood marries a woman with type AB blood. What proportion of their children would you expect to have blood types same as either of their parents? What are the possible blood types of the children? Explain with the help of cross. (5)

(c) What is the expected sex of *Drosophila* with the following chromosome arrangements? (3)

(i) 4X4A

Phenotypic class	No. of progeny
+ + +	370
ec + sv	45
+ + cv	75
+ sc +	50
ec sc cv	385
ec sc +	70
+ sc cv	2
ec ++	3

(i) Which classes represent the parental types, single cross overs and double cross overs. (3)

(ii) Determine the recombination frequencies between each pair of genes, their order and map the distance between the genes on the chromosome. (6)

(v) W. Bateson and R. Punnett

(vi) H. Nilsson-Ehle

(c) Answer the following in one word **(any five)** (5×1=5)

(i) Number of Barr *bodies* in a female with chromosomes 44 + XO

(ii) Number of gametes formed in the cross AABbCc x aabbCc

(iii) When a purine is replaced by another purine in DNA

(iv) Number of linkage groups present in *Drosophila*

(v) Name a manmade cereal crop

(vi) The movement of genetic material from one region to another within the genome

P.T.O.

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

(a) Pure line selection and mass selection

(b) Maternal inheritance and maternal effect

(c) Allopatric and sympatric speciation

(d) Sex-linked and sex-limited characters

(e) Missense and nonsense mutation

(f) Codominance and incomplete dominance

3. Write short notes on **any three** of the following : (3×5=15)

(a) Lethal alleles

(b) Chemical mutagens

(c) Introduction of plant species

(d) Sex determination in humans

(e) CIB method for detection of mutation in *Drosophila*.

4. (a) What is polygenic inheritance? Explain with the help of a cross using suitable example. Write any three characteristic features of this mode of inheritance. (7)

(b) Explain the origin of amphidiploid *Gossypium hirsutum* (New world cotton) and hexaploid wheat from their progenitors with the help of suitable crosses. (4+4=8)

5. A mutant stock of *Drosophila* homozygous for three sex linked genes -*sc(scute)*, *ec(echinus)* and *cv(crossveinless)* was crossed to a wild type. A female F_1 heterozygous for all the three genes when test crossed with a homozygous recessive parent, gave the following result: