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S. No. of Question Paper : 2042

Unique Paper Code : 32161303

GC-3

Name of the Paper : Core VII Genetics

Name of the Course : B.Sc. (H) Botany CBCS

Semester : III

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all.

Question No. 1 is compulsory.

1. (a) Give the technical term used to describe the following : 5
- (i) The phenomenon in which out of 100 flies carrying a gene only 80 express the gene.
 - (ii) Failure of chromosomes to separate during anaphase of meiosis.
 - (iii) Transmission of a trait from a man to his grandson via a carrier daughter.
 - (iv) Masking of alleles of a gene by another non-allelic gene.
 - (v) A cross between the progeny and one of the parents.
- (b) Explain any *five* of the following terms briefly : 5
- (i) Phenocopy
 - (ii) Hemizygous

P.T.O.

- (iii) Position effect
- (iv) Indel mutations
- (v) Expressivity
- (vi) Autosomes.
- (c) Match the following : 5
- | | |
|--------------------------------------|-----------------|
| (i) Incomplete dominance | T.H. Morgan |
| (ii) C/B method | Sutton & Boveri |
| (iii) Chromosomal Maps | Carl Correns |
| (iv) Sex linkage | A.H. Sturtevant |
| (v) Chromosome theory of inheritance | H.J. Muller |
2. (a) "Inversions are crossover suppressors." Comment with suitable illustrations. 8
- (b) What are lethal genes ? Explain with the help of a dominant and a recessive lethal. 5
- (c) How many Barr bodies will be observed in the somatic cells of an individual with : 2
- (i) Turner syndrome
- (ii) Klinefelter syndrome.
3. Write short notes on any *three* : 3×5=15
- (a) Genetic drift
- (b) Role of transposons in mutation
- (c) Inheritance of kappa particles in *Paramecium*
- (d) Sex determination in *Drosophila*.

4. Differentiate between any *five* : 5×3=15
- (a) Monogenic and polygenic inheritance
 - (b) Ionising and non-ionising mutagens
 - (c) Codominance and incomplete dominance
 - (d) Deletion and duplication
 - (e) Autopolyploidy and allopolyploidy
 - (f) Maternal effect and maternal inheritance.
5. (a) Explain any *two* DNA repair mechanisms with illustrations. 8
- (b) What phenotypic ratio will be expected from the following crosses involving ABO blood groups : 3
- (i) $I^A I^B \times I^A I^B$
 - (ii) $I^A I^B \times I^O I^O$
 - (iii) $I^A I^O \times I^B I^O$
- (c) Tetraploids are more likely to survive than triploids in nature. Justify the statement. 4
6. (a) What kind of inheritance mechanism is indicated when variation in F_2 progeny shows a bell shaped curve ? Explain with an example. 4
- (b) Discuss an experiment that gave cytological evidence for crossing over. 6
- (c) A colour blind man is married to a woman with normal vision. They have a normal son and a normal daughter. The daughter marries a normal man.
- (i) Represent the data as a pedigree with genotypes of all individuals. 3
 - (ii) What is the probability of the daughter passing the trait to her children ? 2

7. (a) Consider p , q and r to be three recessive mutations in *Drosophila*. An F_1 female heterozygous for all three loci was test crossed and the following progeny obtained :

$+ + +$	344
$+ + r$	106
$+ q +$	2
$+ q r$	68
$p q r$	313
$p + r$	3
$p q +$	92
$p + +$	72
Total	1000

- (i) Are the above genes linked ? Give reasons for your answer. 2
- (ii) Provide a Diagrammatic representation of the cross. 3
- (iii) Construct a map of the three genes. 3
- (iv) Calculate the interference. 2
- (b) Discuss the principles of Darwin's theory of evolution based on natural selection citing appropriate examples. 5