

**2012**

**PRINCIPLES OF TRANSMISSION GENETICS**

*Time Allotted : 3 Hours*

*Full Marks : 70*

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for any *ten* of the following :

10x1 = 10

- i) If we cross a pea plant that is homozygous dominant for tallness and that is heterozygous, what will be the genotypes of the offspring that are tall ? ( D and d represent the alleles for height in pea plants )
- a) All will DD b) Dd in most cases  
c) Dd only d) DD or Dd.
- ii) Which is the correct indication for Mendel's Law of Segregation ?
- a) A cross between parents pure for a certain trait will produce hybrids  
b) Chromosomes move apart during anaphase II of meiosis  
c) For genes that are not on the same chromosome, alleles assort independently of one another into gametes  
d) Alleles of gene are sorted into separate sex cells and then recombine with another alleles at

fertilization.

iii) How many linkage groups are present in *Drosophila* ?

a) 8 b) 4

c) 6 d) 2.

iv) The ratio for dominant epistasis action is

a) 9 : 7 b) 9 : 3 : 4

c) 12 : 3 : 1 d) 15 : 3.

v) A mother of blood group 'O' has a group 'O' child. The father could be

a) A or B or O b) O only

c) A or B d) AB only.

vi) Genetic causes of Down syndrome is

a) Tetrasomy b) Trisomy

c) Nullisomy d) Monosomy.

vii) Idiogram is the graphical representation of

a) chromosome structure

b) No. of chromosome

c) No. of gene

d) No. of DNA.

viii) Humans normally have 46 chromosomes in body cells.

How many autosomes would be expected in liver cells ?

a) 46 b) 23

c) 44 d) 22.

ix) Klinefelter's syndrome is the example of

a) deletion b) non-disjunction

c) trisomy d) aneuploidy.

x) Amphidiploidy is a type of

a) Aneuploidy b) Trisomy

c) Polyploidy d) Translocation.

xi) 1 cM is

a) 1 centimorgan b) 1 centromere

c) 1 centimetre d) none of these.

### **GROUP – B**

#### **( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. Write down the difference between Back cross and Test cross with example.

3. Determine the probability that a plant of genotype CcWw will be produced from the parental plants of the genotype CcWw and Ccww.

4. What is Expressivity and Pleiotropism ?

5. Describe the pattern of uniparental inheritance in chlamydomonas.

6. In what respect does multiple allele differ from pseudoallele ?

### **GROUP – C**

#### **( Long Answer Type Questions )**

Answer any *three* of the following.  $3 \times 15 = 45$

7. What is reciprocal crosses ? Briefly describe Incomplete and Codominance. What is Bombay Phenotype ? What is Erythroblastosis fetalis ?  $3 + 3 + 3 + 3 + 3$

8. a) The dihybrid parent have dominant and recessive alleles at one gene locus and codominant alleles at second gene locus, the F<sub>2</sub> 9 : 3 : 3 : 1 phenotype ratio becomes 3 : 6 : 3 : 1 : 2 : 1. Explain with an example.

b) What is Penetrance ? Explain with example.

c) What is epistasis ? Give one example of Dominant

epistasis. 5 + 5 + 5

9. a) Red colour in wheat kernel is produced by the genotype

R\_B\_, white by the double recessive genotype ( rrbb ).

The genotype R\_bb and rrB\_ produce brown kernels. A

homozygous red variety is crossed to a white variety.

What phenotypic result are expected in the F<sub>1</sub> and F<sub>2</sub> ?

b) Explain the mechanism of crossing over.

c) Briefly describe Linkage. 6 + 4.5+ 4.5

10. What is euploidy ? How are euploids classified ? Discuss

the meiotic segregation pattern of aneuploids in plants. What

is nullisomy ? 2 + 4 + 7 + 2

11. a) For a population which has an allelic frequency of

$p = 0.8$ , calculate the Hardy-Weinberg equilibrium

frequencies of genotypes for that population. 5

b) Write short notes on any *two* of the following : 2x5

i) Translocation

ii) Position effect variegation

iii) Modifying genes.

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