

2013

**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

questions :  $10 \times 1 = 10$

- i) Genetic linkage was discovered by
  - a) G. J. Mendel b) T. H. Morgan
  - c) A. Kornberg d) None of them.
- ii) The study of single gene inheritance is achieved by performing
  - a) Monohybrid cross b) Dihybrid cross
  - c) Test cross d) None of these.
- iii) In paracentric inversions
  - a) dicentric bridge and acentric fragment are produced
  - b) only dicentric bridge is produced
  - c) only acentric fragments is produced
  - d) both dicentric bridge and acentric fragment are not found.
- iv) In paracentric inversions
  - a) dicentric bridge and acentric fragment are produced

- b) only dicentric bridge is produced
  - c) only acentric fragment is produced
  - d) both dicentric bridge and acentric fragment are not found.
- v) 1 cM is
- a) 1 centimorgan b) 1 centromere
  - c) 1 centimetre d) none of these.
- vi) Copy choice theory was proposed by
- a) J. Lederberg b) C. D. Darlington
  - c) R. Holliday d) none of them.
- vii) Separation of linked genes is caused by
- a) linkage b) segregation
  - c) crossing over d) genetic mutation.
- viii) The total X chromosome inactivation is also known as
- a) X-inactivation b) imprinting
  - c) methylation d) acetylation.
- ix) Complete linkage is seen in
- a) human male b) human female
  - c) female *Drosophila* d) male *Drosophila*.
- x) If an organism is crossed, with homozygous recessive individual, it is called
- a) back cross b) monohybrid cross
  - c) test cross d) reciprocal cross.
- xi) Recessive characters are expressed
- a) on any autosome
  - b) on any chromosomes of the female
  - c) when they are present on X-chromosome of male
  - d) none of these.

- xii) Balanced rearrangement is
- a) Duplication b) Deletion
  - c) Inversion d) All of these.
- xiii) Robertsonian translocation is one of the main cause of
- a) down syndrome b) Edward syndrome
  - c) Patau syndrome d) Klinefelter syndrome.
- xiv) The total X chromosome inactivation is also known as
- a) X-inactivation b) imprinting
  - c) methylation d) acetylation.
- xv) Paramecium undergoes sexual exchange through a mating process is called
- a) Conjugation b) Autogamy
  - c) Allogamy d) None of these.
- xvi) Cytoplasmic inheritance was recognized by
- a) G. J. Mendel b) Carl Correns
  - c) D. P. Snustad d) F. J. Gardner.
- xvii) The inheritance of mitochondria in *Chlamydomonas* through
- a) *mt* + parent
  - b) *mt* – parent
  - c) Both *mt* + parent and *mt* – parent
  - d) none of these.

### **GROUP – B**

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

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

2. Describe multiple alleles for coat colour in rabbits.
3. What is sex influenced dominance ? Give example.
4. Describe the cytological evidence of crossing over.

5. Write a short note on Cri-Du-Chat syndrome.
6. Write short note on chloroplast's gene expression.
7. What is  $t$  test ? Write the significance of  $p$ -value.

**GROUP – C**

**( Long Answer Type Questions )**

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

8. a) Write a note on 'crossing over'.
- b) What is the significance of crossing over ?
- c) What is linkage group ? Write the number of linkage group found in *Drosophila*.
- d) What is pleiotropism ?
9. a) Write the classification of chromosomal mutation based on chromosomal variation in number.
- b) What is induced polyploidy ?
- c) Write the basic difference between deletion and duplication.
- d) In which human cells contain polyploidy ?
10. a) Write short notes on any *four* of the following :
  - (i) Human Karyotype
  - (ii) Banding techniques
  - (iii) Mitochondrial inheritance
  - (iv) Cytological mapping
  - (v) Position effect.
- b) What is the genotype of Klinefelter's syndrome ?
11. a) A cross involving  $x$  linked genes was made between yellow bar, vermilion female flies and wild type males. The  $F_1$  female were crossed with  $y^B + v$  males. The following phenotypes were obtained :

$yBv \ \& \ +++ \rightarrow 546$

$y++ \ \text{and} \ +Bv \rightarrow 244$

$y + v \ \text{and} \ + B+ \rightarrow 160$

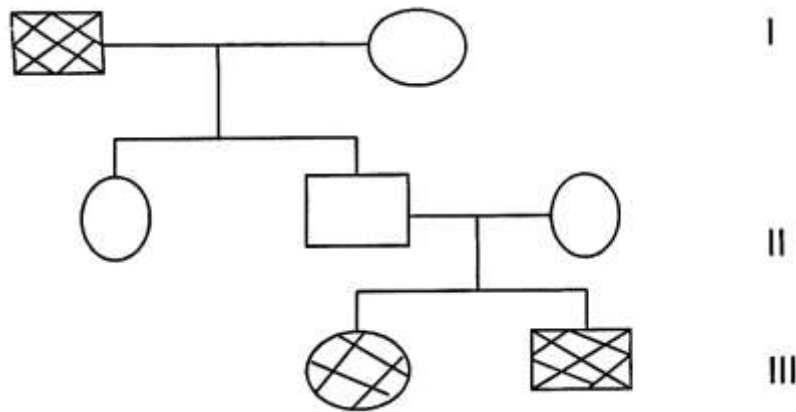
$yB + \ \& \ + + v \rightarrow 50$

(i) What is the correct order of these genes on the *x*-chromosome ?

(ii) What are the genetic map distance between (*y*), (*B*) and (*v*) ?

b) Write a note on 'chi-square' test.

12. a)



(i) The above Pedigree, show which type of inheritance ?

(ii) Write the suspected genotype of each individuals in the pedigree.

b) A man with group A blood marries a woman with group B blood. Their child has group O blood.

(i) What are the genotypes of these individuals ?

(ii) What other genotypes and in what frequencies, would you expect in offspring from this marriage ?

c) What is co-dominant and in-complete dominant ?

=====