



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Sc.(H)/BT/GENT/MICRO-BIO/MOL-BIO/SEM-2/PTG-202/2013**

**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 × 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

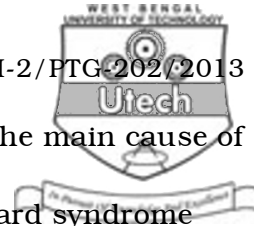
- |                     |                   |
|---------------------|-------------------|
| a) Monohybrid cross | b) Dihybrid cross |
| c) Test cross       | d) None of these. |



- 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.  $3 \times 15 = 45$

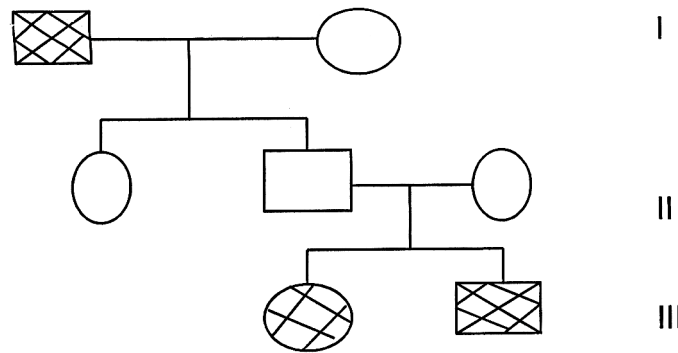
8.
  - a) Write a note on 'crossing over'.
  - b) What is the significance of crossing over ?
  - c) What is linkage group ? Write the number of linkage group found in *Drosophila*.
  - d) What is pleiotropism ?
9.
  - a) Write the classification of chromosomal mutation based on chromosomal variation 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  $yB + v$  males. The following phenotypes were obtained :
- |                    |        |     |
|--------------------|--------|-----|
| $yBv$ & $+++$      | —————> | 546 |
| $y++$ and $+Bv$    | —————> | 244 |
| $y + v$ and $+ B+$ | —————> | 160 |
| $yB +$ & $++ v$    | —————> | 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 ?

