



Name :

Roll No. :

Invigilator's Signature :

CS/B.Sc. (H) (BT/Mol·Bio/Genetics/MicroBio)/SEM-2/PTG-202/2011

2011

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 :

$10 \times 1 = 10$

i) If you cross a pea plant that is homozygous dominant for tallness and one that is heterozygous, what will be the genotypes of the offspring that are tall ? (if *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*.

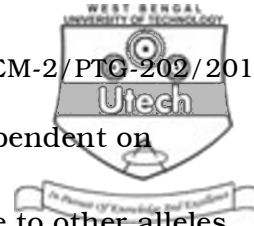


ii) Which is the correct indication for Mendel's Law of Segregation ?

- 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 a gene are sorted into separate sex cells and then recombine with another allele at fertilization.

iii) A rooster with gray feathers is mated with a hen of the same phenotype. Among their offspring, 15 chicks are gray, 6 are black, and 8 are white. What is the simplest explanation for the inheritance of these colours in chickens ?

- a) Codominance
- b) Incomplete dominance
- c) Blending theory
- d) Multiple alleles.



- iv) An allele, dominant or recessive is dependent on
- a) how common the allele is relative to other alleles
 - b) whether it is inherited from the mother or the father
 - c) whether it or another allele determines the phenotype when both are present
 - d) whether or not it is linked to other genes.
- v) Somatic cells of human have chromosomes and are called
- a) 10, haploid
 - b) 92, diploid
 - c) 23, haploid
 - d) 46, diploid.
- vi) Cri-Du-Chat is caused by a deletion on the short arm of chromosome
- a) 3
 - b) 5
 - c) 7
 - d) 9.
- vii) A total X chromosome inactivation is also known as
- a) X-inactivation
 - b) imprinting
 - c) acetylation
 - d) methylation.



- viii) Robertsonian translocation is one of the main cause of
- a) Down syndrome
 - b) Edward syndrome
 - c) Patau syndrome
 - d) Klinefelter syndrome.
- ix) The degrees of freedom for a t -test of a mean if the sample size is 10, is
- a) 10
 - b) 9
 - c) 11
 - d) 12.
- x) The chi-square distribution is
- a) Symmetrical about a mean value
 - b) Right skewed
 - c) Left skewed
 - d) None of these.
- xi) In *Drosophila*, the two genes w and sn are X-linked and 25 map units apart. A female fly of genotype $w^+ sn^+ / w sn$ is crossed to a male from a wild-type line. What percentage of male progeny will be $w^+ sn$?
- a) 0
 - b) 12.5%
 - c) 25%
 - d) 37.5%.
- xii) A human having two numbers of same allele is said to be
- a) Homozygous
 - b) Heterozygous
 - c) Codominant
 - d) None of these.



GROUP – B

(Short Answer Type Questions)

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

2. Differentiate between back cross & test cross. Briefly write down the significance of test cross. $2 + 3$
3. Explain the term 'pedigree'. State with example, the significance of outsider role with reference to pedigree. $2 + 3$
4. What is FISH ? Briefly indicate its advantages & drawbacks. $1 + 4$
5. Explain single gene inheritance.
6. Write a short note on Cri-Du-Chat syndrome.

GROUP – C

(Long Answer Type Questions)

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

7. Write short notes on the following : 3×5
 - a) Banding technique
 - b) Induced polyploidy
 - c) Down syndrome.



8. In corn, the following allelic pairs have been identified in chromosome 3 :

+/b = plant colour booster *vs* non-booster

+/Ig = ligulelid *vs* liguleless

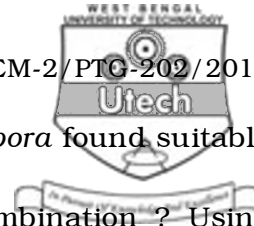
+/v = green plant *vs* virescent.

A test cross involving triple recessives and F1 plants heterozygous for the three gene pairs gave in the progeny the following phenotype :

+	v	Ig	305
b	+	Ig	128
b	v	Ig	18
+	+	Ig	74
b	v	+	66
+	+	+	22
+	v	+	112
b	+	+	275

Give the gene sequence, the map distances between the genes and the coefficient of coincidence. 5 + 5 + 5

9. Explain the term 'linkage'. State the chromosome theory of linkage. Explain the phenomenon of incomplete linkage with supportive example. Why is linkage an exception to Mendel's second law ? 2 + 5 + 5 + 3



10. What is tetrad analysis ? How was *Neurospora* found suitable for the study of crossing over and recombination ? Using *Neurospora*, how can one show that crossing over takes place at four strand stage ? Briefly state the significance of crossing over. 2 + 4 + 6 + 3

11. Write short notes on the following : 3 × 5

- a) Bombay phenotype
 - b) *t*-test
 - c) Maternal inheritance.
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