Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH/BT(N)/SEM-5/BT-501/2012-13

2012
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 × 1 = 10

   i) Down's syndrome is an example of

   a) Aneuploidy b) Polyteny

   c) Polyploidy d) Monoploidy.

   ii) An interaction between non-allelic genes in which an allele at one locus prevents expression of an allele at another locus, but not vice versa, is called

   a) Collaboration b) Complementation

   c) Epistasis d) Modification.

iii) The process of carrying some of the bacterium, and partially digested chromosome by a lytic bacteriophage to another host cell is called

a) Transformation

b) Generalized transduction

c) Specialized transduction

d) Conjugation.

iv) Removal of damaged DNA by light dependent enzyme is called

a) Base excision repair

b) Mis-match repair

c) Photo-reactivation repair

d) SOS repair.

v) Gene pool is

a) total number of nucleotide present in a cell

b) sum total of gene present in a reproductive gamete

c) both (a) and (b)

d) none of these.

vi) F plasmid is also called

a) episome b) linear plasmid

c) both (a) and (b) d) none of these.

vii) Mutation may cause

a) polyploidy b) chromosal aberration

c) variation d) all of these.

viii) Which one of the following represent a true heterozygous arrangement of genes ?

a) TTRR b) ttrr

c) TTrr d) TtRr.

ix) The bacteriophage with a single stranded circular DNA , as genome is

a) T4 phage b) λ phage

c) MS2 d) $\phi \times 174$.

x) Which of the following is not a method for gene transfer in bacteria ?

a) Transformation

b) Translocation

c) Conjugation with *Hfr* transfer

d) Transduction.

xi) Photo reactivation is the process where damage caused by ..... can be removed.

a) Ions

b) Radiation

c) UV

d) Temperature.

xii) Most widely used in phylogenetic studies of bacteria is

a) *m*RNA b) *t*RNA

c) 16*s* *r*RNA d) 23*s* *r*RNA.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Discuss on blue-white screening and antibiotic resistance in bacteria.

3. Define the term 'conjugation', ''transformation and 'transduction' with reference to similarity and differences between there processes.

4. Define tumor suppressor gene and oncogene. Give two examples.

5. Hemoglobin from two individuals are compared by electrophoresis and by finger printing. Electrophoresis reveals no differences in migration, but finger printing showed an amino acid difference. How is this possible ?

6. Crossing of purple eyed straight winged Drosophila with red eyed curve wing one produced dihybrid red eyed straight winged females in F1. On crossing such F1 females with double recessive purple eyed curved winged males gives the following phenotyps.

Red eyed straight wing 339, purple eyed straight wing 612, red eyed curved wing 725, purple eyed curved wing 348.

Find out whether or not F2 generation obey the test cross ratio. Critical at *df* 3 value χ^2 at $p = 0{\cdot}05$ is 3·82.

GROUP – C

(Long Answer Type Questions)

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

7. a) In Drosophila three recessive genes — frizzled (*fz*), hairy (*h*), and eagle (*eg*) are present on third chromosome. The cross

$$\frac{+ \quad + \quad +}{h \;\; fz \;\; eg} \times \frac{h \;\; fz \;\; eg}{h \;\; fz \;\; eg}$$

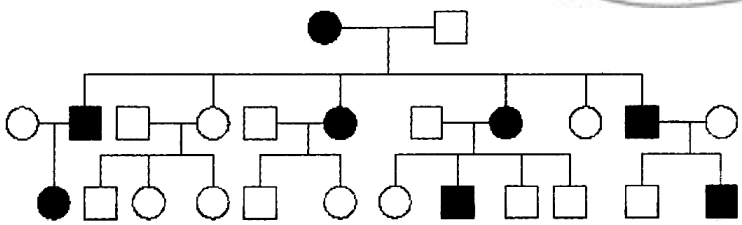
yielded the following phenotypes

+++ 40, *fz* + *eg* 5, *fz h eg* 42, + *h* + 7, + + *eg* 2, *fz h* + 2, *fz* + + 1, + *h eg* 1

What was the male parent (remember that crossing over does not occur in male *Drosophila*) ?

Construct a map of three genes, indicating the correct gene order.

b) Differentiate between generalized and specialized transduction with proper diagram. 8 + 7



8. Analyse the pedigree.

One per cent male exhibit sex linked recessive gene. What is the frequency of heterozygous women, homozygous recessive woman ? 10 + 5

9. What are oncogenes and proto-oncogenes ? Write the different phases of cell cycle narrating the role of *Cdk*, cyclin and P_{53}. What is Apoptosis ? 5 + 8 + 2

10. a) Find the median, median class and mode from the following data :

Marks	1-5	6-10	11-15	15-20	21-35
No. of students	7	10	16	32	24

b) Differentiate between Standard deviation and Mean deviation.

c) Find whether or not there is a significant correlation between O_2 consumption (ml per minute) and pulmonary minute ventilation (litres per minute) using the following data. [Given $t_{0\cdot05(7)} = 2\cdot365$]

Individuals	1	2	3	4	5	6	7	8	9
O_2 consumption	281	246	369	330	258	315	246	330	298
Ventilation	6·55	7·10	9·00	8·50	6·00	7·00	6·50	9·00	7·50

d) Application of fertilizers was tested for the yield of rice grown in 10 plots. Another seed of 10 plots of similar size and condition was taken as control.

With Fertilizer	16	14	18	15	13	17	16	15	14	13
Without Fertilizer	10	12	11	9	13	13	12	14	13	11

Test the effect of fertilizer. Tabulated value of t at p 0·05 for df 18 is 2·10. 5 + 2 + 4 + 4

11. What is 'Analysis of Variance' ? State why it is important and to use it in doing biological experiments. What is the importance of t test, particularly if the mean values differ in

(i) replications

(ii) repeats of same test / experiment ? 4 + 6 + 5