B.Sc. BIOTECHNOLOGY
Third Semester
GENETICS
(BBT – 11)

Duration: 3Hrs. **Full Marks: 70**

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

Answer any *five* of the following questions:

1. Distinguish between the following: (2×5=10)
   (i) Dominance and Epistatis.
   (ii) Back cross and Test cross.
   (iii) Forward mutation and reverse mutation.
   (iv) Complete and incomplete linkage.
   (v) Gene and allele.
2. State the different types of two-gene epistatic interactions. Discuss any two of them with appropriate examples. (3+7=10)
3. Describe the mechanism of meiotic crossing over. (10)
4. What do you mean by structural and numerical aberrations in chromosomes? Give the appropriate classifications with genomic formulae for the numerical changes in the chromosomes. Discuss the cytological features of any two of them. (10)
5. What do you mean by linkage and crossing over? Discuss different types and phases of linkage. Which factors affect the crossing over between linked genes?(10)

6. What is Hardy-Weinberg Law of Equilibrium? Prove the law with appropriate deduction. Name the factors affecting the gene and genotype frequencies in a random mating population. (10)
7. State Mendel's Laws of Inheritance. Discuss one of the laws with an example from Mendel's experiments. Which of these laws is not universal and why? (3+3+4=10
8. Describe various mechanisms of sex determination with examples. (10)

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REV-00
BBT/84/90 2015/12

B.Sc. BIOTECHNOLOGY
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Duration: 20 minutes **Marks – 20**

(PART A - Objective Type)

I. Choose the correct answer: **1×10=10**

(i) The phenotype of the heterozygote is same with that of either homozygote in
(a) incomplete dominance (b) codominance
(c) complete dominance (d) overdominance

(ii) When the two alleles of a gene produce their identifiable characteristic properties in the heterozygote then the phenomenon is called
(a) incomplete dominance (b) codominance
(c) complete dominance (d) overdominance

(iii) Which of the following genotypes causes Klinefelter syndrome?
(a) XO (b) XXY (c) XX (d) XYY

(iv) Incomplete dominance was first observed by
(a) Hugo de Vries (b) Carl Correns
(c) Mendel (d) Tschermak

(v) Bateson and Punnett studied gene interaction in
(a) sweet pea (b) grass pea
(c) pigeon pea (d) chick pea

(vi) X-linkage was discovered for the first time in
(a) ants (b) mice (c) chickens (d) fruit flies

(vii) Those mutations that arise in the absence of known mutagen are known
(a) Induced mutations (b) Fused mutations
(c) Spontaneous mutations (d) None of the above

(viii) The law of segregation operates during
(a) meiosis (b) mitosis
(c) fertilization (d) organogenesis

(ix) Who coined the term "gene"?

(a) W. Bateson (b) W.L. Johannsen

(c) R.C. Punnett (d) Hugo de Vries

(x) How many characters of *Pisum sativum* were studied by Gregor Johan Mendel?

(a) 10 (b) 14 (c) 7 (d) 20

II. Fill in the blanks: **1×10=10**

a) When a gene produces more than one trait then the phenomenon is called _____.

b) When a gene has more than two alleles then the phenomenon is called _____allelism.

c) When a trait is governed by one or few genes and the effect of environment on the expression of the gene(s) is nil or negligible then the trait is called _____trait.

d) When the effect of a gene is suppressed by the effect of another gene (locus) the gene being suppressed is called _____.

e) The gene interaction giving an F_2 phenotypic ratio of 12:3:1 is called _____.

f) Most of the lethal genes are _____lethal.

g) Crew's hen is an example of _____.

h) Pairing of two homologous chromosomes is initiated during_____ stage of prophase I.

i) Crossing over does not take place in _____*Drosophila*.

j) Sickle cell anemia is an example of _____gene.

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