Registration No: | | | | | | | | | | |

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B.TECH
PBT3D001

3rd Semester Regular Examination 2016-17
GENETICS
BRANCH: Biotechnology (Honours)
Time: 3 Hours
Max Marks: 100
Q.CODE: Y788

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type*** **(2 x 10)**

a) The innate tendency of offspring to resemble their parents is called
   a) Variation
   b) Heredity
   c) Inheritance
   d) Resemblance

b) The best method to determine the genotype of dominant parent is by crossing it with the hybrid. This cross is called
   a. Back cross
   b. Test cross
   c. Selfing
   d. Cross fertilization

c) The genetic disorder sickle-cell anemia is an example of
   a. Pleiotropy
   b. Epistasis
   c. Heterozygous dominance
   d. Homozygous dominance

d) In a population of red (dominant allele) or white flowers, the frequency of red flowers is 91%. What is the frequency of the red allele?
   a. 9%
   b. 30%
   c. 91%
   d. 70%

e) An individual's fitness is determine by its
   a. Ability to complete for limited resources
   b. Resistance to diseases
   c. Ability to escape predators and avoid parasities
   d. Physical strength and hardiness
   e. Success in contributing genes to future generations

f) Which of the following would cause deviation from the Hardy-Weinberg equilibrium?
   a. Small population
   b. Isolated
   c. Random mating
   d. Lack of selection pressure
   e. No mutations

g) The total aggregate of alleles in a population is referred to as
   a. The gene pool
   b. The allelic frequency
   c. The genotypic frequency
   d. The genetic structure
   e. None of these

h) Which of the following describes gene flow?
   a. Random mating
   b. Migration
   c. Genetic drift
   d. Selection

i) Composite transposons can be recognized by which of the following characteristics?
   a. Inverted repeats.
   b. Direct repeats.
   c. Two pairs of inverted repeats flanking an intervening gene.
   d. Two pairs of direct repeats flanking a transposase gene

j) Which of these is an example of a quantitative trait?
   a. A study compares rats with and without pigment in the irises of their eyes.
   b. Chinese strains of pigs have larger numbers of piglets per litter than American strains.
   c. Caterpillars exposed to juvenile hormone mimics are unable to metamorphose into adults.
   d. None of these

Q2 **Answer the following questions: *Short answer type*** **(2 x 10)**

a) Name any four characters studies by Mendel in sweet pea?
b) Differentiate between dominance and epistasis?
c) Give two examples of multiple alleles in human?
d) Why dominant X-Linked traits are more frequent in females than males?
e) Define pleiotrophism?
f) What are the objectives of plant breeding?
g) What is hybrid viguor?
h) Explain function of transposable elements?
i) What is genetic drift?
j) In a population that is in Hardy-Weinberg equilibrium, the frequency of the recessive homozygote genotype of a certain trait is 0.09. Calculate the percentage of individuals homozygous for the dominant allele?

Part – B (Answer any four questions)

Q3 **a)** Discuss Mendel's laws of inheritance. Which law do you think is most important and why? **(10)**

b) Briefly describe the various evidences, which prove that genes are located in chromosomes? **(5)**

Q4 **a)** Explain mitochondrial inheritance with some suitable example? **(10)**

b) In Pea ,tall plant is dominanat over dwarf plant.If a homozygous tall is crossed with a dwarf plant, describe the following **(5)**

I. The genotypes and phenotypes of F1 and F2 progeny
II. The gametes produced by F1
III. The genotypes and phenotypes of testcross progeny

Q5 **a)** What is linkage? Describe different type of linkage with suitable example? **(10)**

b) Explain transposable element? Write different types of transposable element? **(5)**

Q6 **a)** Explain different type of epistasis with suitable example? **(10)**

b) What is X-linked inheritance? What are some of the different types of X-linked recessive conditions? **(5)**

Q7 **a)** What is heterosis? What are its major manifestations? How has its this phenomenon been utilized for plant breeding? **(10)**

b) What is the clinical deficiency presented by haemophilia people? What is the genetic cause of that deficiency? **(5)**

Q8 **a)** What are the factor that affecting the gene frequencies in a population? **(10)**

b) A study on blood types in a population found the following genotypic distribution among the people sampled: 1101 were MM, 1496 were MN and 503 were NN. Calculate the allele frequencies of M and N, the expected numbers of the three genotypic classes (assuming random mating). Using X^2, determine whether or not this population is in Hardy-Weinberg equilibrium **(5)**

Q9 **a)** Explain QTL? What is the importance of QTL in genetics? **(10)**

b) What will be the frequency of heterozygote Aa in a random mating population, if **(5)**
1)the frequency of recessive phenotype(aa) is 0.09
2)the frequency of all dominant phenotypes is 0.19