



**BRAINWARE UNIVERSITY**  
**Term End Examination 2018 - 19**  
**Programme – Bachelor of Science (Honours) in Biotechnology**  
**Course Name – Genetics**  
**Course Code – BBTH010402**

(Semester –1)

**Time allotted: 3 Hours**

**Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

**Group –A**

(Multiple Choice Type Question)

10 x 1 = 10

1. *Choose the correct alternative from the following*

- (i) Mitotic cell division results in two cells that have;
- |                                                  |                                                  |
|--------------------------------------------------|--------------------------------------------------|
| a. n chromosomes and are genetically identical.  | b. n chromosomes and are genetically different.  |
| c. 2n chromosomes and are genetically identical. | d. 2n chromosomes and are genetically different. |
- (ii) An example of alleles is;
- |            |            |
|------------|------------|
| a. AB & Tt | b. TT & Tt |
| c. T & t   | d. X & Y   |
- (iii) Mendelian recombination are due to;
- |                                          |                  |
|------------------------------------------|------------------|
| a. Linkage.                              | b. Modification. |
| c. Independent assortment of characters. | d. Mutations.    |
- (iv) Which is a sex linked disease?
- |                         |                 |
|-------------------------|-----------------|
| a. Sickle cell anaemia. | b. Haemophilia. |
| c. Phenyl ketonuria.    | d. Albinism.    |
- (v) *Datura* is a classical example for a;
- |              |               |
|--------------|---------------|
| a. Trisomic. | b. Monosomic. |
| c. Triploid. | d. Monoploid. |

- (vi) Which of the following factors could lead to variations in the offspring of asexually reproducing organisms?
- |                   |                            |
|-------------------|----------------------------|
| a. Crossing over. | b. Fertilization.          |
| c. Mutations.     | d. Independent assortment. |
- (vii) The term meiosis was coined by;
- |                             |                       |
|-----------------------------|-----------------------|
| a. Hertwig and Van Bevedin. | b. Sutton and Boveri. |
| c. Hofmeister and Waldeyer. | d. Farmer and Moore.  |
- (viii) A strand of DNA with the sequence TAACTG will have a complimentary RNA strand with the following sequence:
- |           |           |
|-----------|-----------|
| a. GTCAAT | b. ATTGAC |
| c. UTTGAC | d. AUUGAC |
- (ix) A pedigree chart shows:
- |                                                   |                                                  |
|---------------------------------------------------|--------------------------------------------------|
| a. The genotypic ratios of the offspring.         | b. The types of gametes produced by the parents. |
| c. The pattern of inheritance of a specific gene. | d. The genotypic expression.                     |
- (x) Isozyme is a;
- |                    |                          |
|--------------------|--------------------------|
| a. DNA marker.     | b. Morphological marker. |
| c. Protein marker. | d. None of these.        |

### Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following

- |    |                                                                                                                                          |     |
|----|------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2. | a. Write the significance of meiosis.                                                                                                    |     |
|    | b. Mention the phases of cell cycle with time frame in eukaryotes.                                                                       | 2+3 |
| 3. | Write the different ways by which spontaneous mutation occurs. Write the different chemical and physical agents for induced mutagenesis. | 2+3 |
| 4. | Write brief note on the following:                                                                                                       | 2½  |
|    | a. Synaptonemal complex.                                                                                                                 | +   |
|    | b. Metaphase plate                                                                                                                       | 2½  |
| 5. | Write the concept of DNA marker with examples (any four).                                                                                | 1+4 |
| 6. | Describe the genetic map of <i>F</i> plasmid with diagram.                                                                               | 5   |

**Group – C**

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

7. (a) In pea, tall plant is dominant over dwarf plant. If a homozygous tall plant is crossed with a dwarf plant, describe (i) the genotypes and phenotypes of F<sub>1</sub> and F<sub>2</sub> Progeny. 2+4
- (b) What is chromosome banding? Mention its application. 3+2
- (c) What is SOS repair? 2
- (d) Define karyotype? 2
8. (a) Species 'A' has 2n=16 chromosomes. How many chromosomes will be found per cell in each of the following polyploid originated from species 'A'?
- i) Monosomic,
  - ii) Autotriploid
  - iii) Autotetraploid
  - iv) Trisomic
  - v) Double monosomic
  - vi) Double trisomic
  - vii) Nullisomic
  - viii) Autopentaploid
  - ix) Tetrasomic 10
- (b) Explain dominant epistasis and recessive epistasis with a suitable diagram. 5
9. (a) Illustrate Multiple Alleles with ABO blood group as an example. A woman homozygous for blood type B marries a man who is heterozygous for blood type A. State the possible phenotypic ratio of the offspring. 10
- (b) Explain the Lamarck's theory with suitable examples. 5
10. (a) Describe the significance of Hardy – Weinberg Principle 5
- (b) i) Define 'species'.  
ii) Describe population concept with examples. 1+4
- (c) Briefly highlight the history of genetics with major discoveries during the period of 1950-2010. 5
11. (a) i) Write short note on 'Barr body'.  
ii) Define satellite DNA, cistron, exon and intron in eukaryotic genome. 2+4
- (b) i) Explain linkage mapping in *Drosophila melanogaster*.  
ii) Write short note on 'gene recombination' and 'allele frequency'. 3+2
- (c) Write the differences between;  
i) Autosome vs. sex chromosome,  
ii) Segregation vs. independent assortment. 2
- (d) Write the differences between;  
i) Genotype vs. phenotype.  
ii) Homozygous vs. heterozygous. 2