



BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Sc.(MLT)-2020/B.Sc.(MLT)-2021
Course Name – Genetics & Molecular Biology
Course Code - BMLT602
(Semester VI)

Full Marks : 60

Time : 2:30 Hours

[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)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Select the incorrect option:
- a) DNA replication is very accurate. b) DNA carries all the information related to a species.
- c) DNA synthesizes protein. d) DNA is acidic in nature.
- (ii) Predict the basic requirement(s) of PCR reaction.
- a) A heat-stable DNA polymerase b) DNA segment to be amplified
- c) Oligonucleotide primers d) All of these
- (iii) Choose the correct option: In polymerase chain reaction, the denaturation process is done at:
- a) Heating between 40 to 60°C b) Heating between 50-72°C
- c) Heating between 90 to 98°C d) None of these
- (iv) Identify the advantages of polymerase chain reaction.
- a) It produces millions of DNA fragments. b) It can quantify the produced DNA.
- c) It can be used to analyze mutations. d) All of these
- (v) A man has enlarged breasts, sparse hair on body and genotype as XXY. Identify the type of disease.
- a) Down's syndrome b) Klinefelter's syndrome
- c) Turner syndrome d) Edward's syndrome
- (vi) Identify the option which is true for karyotyping.
- a) It detects chromosomal numbers. b) It detects chromosomal shapes
- c) It may diagnose genetic diseases d) All of these
- (vii) The scientific study of heredity, variations and the environmental factors responsible for them is known as
- a) Physiology b) Genetics
- c) Evolution d) Ecology
- (viii) Law of segregation also refers to

- a) Law of purity of characters
c) Law of purity of gametes
- b) Law of complete purity
d) None of these
- (ix) What is crossing over?
- a) The exchange of genetic material between non-homologous chromosomes
c) The separation of sister chromatids during meiosis
- b) The exchange of genetic material between homologous chromosomes
d) The fusion of gametes during fertilization
- (x) Which of the following events occurs immediately after crossing over?
- a) Separation of homologous chromosomes
c) Condensation of chromosomes
- b) Formation of tetrads
d) Synapsis of homologous chromosomes
- (xi) When does recombination between linked genes occur?
- a) During prophase II of meiosis
c) During metaphase II of meiosis
- b) During prophase I of meiosis
d) During anaphase of mitosis
- (xii) In a dihybrid cross involving two linked genes, if the recombination frequency between them is 30%, what proportion of the offspring would be expected to show recombinant phenotypes?
- a) 30%
c) 70%
- b) 60%
d) 100%
- (xiii) The presence of more than one Barr body in a female cell indicates:
- a) Abnormal X chromosome number
c) Y chromosome presence
- b) Normal X chromosome number
d) None of these
- (xiv) The process of X chromosome inactivation is mediated by which molecule?
- a) DNA polymerase
c) XIST RNA (X-inactive specific transcript RNA)
- b) Histone proteins
d) Ribosomes
- (xv) Which disorder is caused by abnormalities in X chromosome inactivation?
- a) Down syndrome
c) Fragile X syndrome
- b) Turner syndrome
d) Rett syndrome

Group-B

(Short Answer Type Questions)

3 x 5=15

2. In a dihybrid cross with epistatic interactions, if the genotype of one gene masks the expression of another gene, what phenotypic ratios would be expected in the offspring? (3)
3. "Diplonema is an important stage of meiosis 1 in female reproduction"- explain (3) and justify
4. Justify the term: Codon is Universal (3)
5. Explain the role of crossing over during meiosis. (3)
6. Distinguish between epistasis and dominance. What does gene interaction mean? (3)
- OR
- How would you explain ABO blood grouping system as a non mendelian inheritance pattern (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Illustrate Incomplete and co-dominance (5)

8. On the basis of Mendelian genetics the ratio of independent assortment is 9:3:0:1 where as the phenotypic ratio of non- Mendelian genetic give 12:3:1 - Explain with proper justification (5)
9. SOX9 negative with XY chromosome induce a special type of genetic disorder- explain and justified with example. (5)
10. In rabbits, grey hair (G) is dominant to white hair (g) and black eyes (B) are dominant to red eyes (b). If a homologous grey-haired and heterologous black-eyed male rabbit (GGBb) breeds with a heterologous grey-haired and homologous red-eyed female rabbit (Ggbb), calculate the phenotypes and genotypes of their offspring. (5)
11. Colourblindness is a X-linked recessive disorder- explain this statement. (5)
12. The DNA sequence in a segment is TATACATGTCAGCCTACCTAACCTGC. Write the number of amino acids that will be incorporated in the protein chain. (5)

OR

The DNA sequence in a segment is TTATACATGTCAGCCTACTAGTAGATTACTGC. Write the number of amino acids that will be incorporated in the protein chain. (5)
