

Seat No. : _____

BF-102

May-2015

B.Sc., Sem.-IV

BTI-204 : Biotech. Int.

(Basic Genetics)

Time : 3 Hours]

[Max. Marks : 70

1. Answer the following : (any **two**) 14
- (1) Explain Mendel's Laws of inheritance.
 - (2) The I^A , I^B alleles exhibit codominance and I^0 is a recessive allele at the ABO blood-group locus. Give the expected genotypes and phenotypes and their ratios in progeny resulting from the following crosses using punnet square.
 - (i) $I^A I^A \times I^B I^B$
 - (ii) $I^A I^B \times I^A I^B$
 - (iii) $I^A I^0 \times I^A I^B$
 - (iv) $I^A I^0 \times I^B I^0$
 - (3) What is test cross ? Explain the importance of test cross with example.
 - (4) In cucumber Orange fruit colour R is dominant over cream fruit colour r. A cucumber plant homozygous for orange fruits is crossed with plant homozygous for cream fruits. The F_1 are intercrossed to produce the F_2 .
 - (i) Give the genotypes and phenotypes of the parents, the F_1 , and the F_2 .
 - (ii) Give the genotypes and phenotypic ratios of the offspring of a backcross between the F_1 and the orange parent.
 - (iii) Give the genotype and phenotypes of a backcross between the F_1 and the cream parent.
2. Answer the following : (any **two**) 14
- (1) Describe initiation step of DNA replication with a neat diagram.
 - (2) How does the mismatch repair mechanism remove errors caused during DNA replication ?
 - (3) Describe elongation step of translation with a neat diagram.
 - (4) Prove the semi-conservative and bi-directional nature of DNA replication with diagrams.

3. Answer the following : (any **two**) **14**
- (1) Write a short note on spontaneous and induced mutation.
 - (2) What is frame-shift mutation ? How insertion and deletion of bases can lead to frame-shift mutation ?
 - (3) Write a short note on random and site-directed mutagenesis.
 - (4) Describe procedure for detection of carcinogen/mutagen using Ames Test.
4. Answer the following : (any **two**) **14**
- (1) Describe U-tube experiment of Lederberg and Tatum proving gene transfer by conjugation.
 - (2) Explain with diagram key steps of homologous recombination.
 - (3) List out general properties of a plasmid and draw of diagram of any one plasmid.
 - (4) Write a short note on Transposable elements.
5. Answer the following in one or two sentences : **14**
- (1) A man with group A blood marries a woman with group B blood. Their child has group O blood. What are the genotypes of parents ?
 - (2) What is the difference between genotype and phenotype ?
 - (3) While raising Mongolian gerbils some of gerbils were found to have white spots, whereas others have solid coats. What type of crosses could determine if white spots are due to a recessive or a dominant allele ?
 - (4) Which phenomenon is responsible for breaking linkage between genes ?
 - (5) Draw genetic map of the chromosome for the gene pairs and recombination frequencies : A and B = 5, and C = 10 and A and C = 15.
 - (6) Define processivity of DNA polymerase.
 - (7) Show catalytic action of exonuclease.
 - (8) Name the enzyme that acts to prevent shortening of DNA during chromosome replication in eukaryotes.
 - (9) How does nitrous acid cause mutation ?
 - (10) Define mutation.
 - (11) Define mutagen.
 - (12) Give example of vertical gene transfer.
 - (13) What is Chiasma ?
 - (14) Define Specialized transduction.