**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

Date:

**B.Sc. BIOTECHNOLOGY - II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2022**

**(Examination conducted in July 2022)**

**BT 218: Cell Biology and Genetics**

**Time- 2 ½ hrs Max Marks-70**

**This question paper contains TWO printed pages and THREE parts**

**Part A (Answer *ANY TEN* questions) 2mx10=20 marks**

1. What is the function of RuBisCO?
2. During glycolysis, which are the organic molecules that donate a phosphate group to ADP during substrate-level phosphorylation?
3. What are the roles of peroxisomes in plants?
4. What is a Nuclear Localisation Signal? What are the two types of NLS?
5. Differentiate between facultative and constitutive heterochromatin.
6. Define facilitated diffusion using an example.
7. State the Law of Independent Assortment. Give the dihybrid phenotypic and genotypic ratios.
8. What is nondisjunction?
9. What is linkage? How many linkage groups are present in humans?
10. What is Bombay phenotype in humans? Describe its pattern of inheritance.
11. Define ‘gene pool’.
12. What is Univalent Shift?

**Part B (Answer *ANY FIVE* questions) 6mx5= 30marks**

1. Compare and contrast C3 and C4 pathways of photosynthesis.
2. Describe the process of import of proteins into the nucleus.
3. Describe the structure of a eukaryotic ciliar microfilament in detail.
4. Describe briefly any six factors affecting recombination.
5. Given the recombination frequencies between four Drosophila genes Kink (K), Broad (B), Grey (G) and Rolled (R), draw a genetic map indicating the gene order and find out the distance between Kink and Broad. K-G = 54 cM, B-G = 44 cM, B-R = 14 cM and K-R = 4 cM.
6. Outline the origin of Breadwheat.
7. The recessive gene *sh* produces shrunken endosperm in corn kernels and its.
8. What were the phenotypes and genotypes of the original parents?
9. How are the genes linked in F1?
10. Estimate the map distance between *sh* and *c*.

**Part C (Answer *ANY TWO* questions) 10mx2=20marks**

1. Write a note on the eukaryotic cell cycle check points and how specific proteins assist in the progression of the cell cycle through these check points.
2. Using relevant, neatly labelled diagrams, explain how cells synthesise ATP by oxidative phosphorylation.
3. A scientist at the Indian Veterinary Research Institute, Bengaluru had ordered a few albino rabbits for his experiments. Unfortunately, he was only supplied rabbits with black, chinchilla and Himalayan colored coats. However, he proceeded to mate two of them and obtained 2 chinchilla, 1 Himalayan and 1 albino progeny. Considering the order of dominance for coat color in rabbit to be Black>Chinchilla> Himalayan> albino,
   1. Determine the phenotype and genotype of the parents that were bred.
   2. What progeny would you expect from a cross of **Cc x cchch**?
   3. If a cross ofcchchxchc produced a litter of five, what is the probability that three of them are chinchilla and two are Himalayan?

BT 218-A-22