

2022

MICROBIOLOGY

[P.G.]

(M.Sc. Second Semester End Examination-2022)

PAPER- MCB-202

[Genetics and gene regulation]

Full Marks: 40

Time: 02 Hrs

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

Group - A

Marks 20

- 1. Answer any two questions from the following: 2x2= 4**
- a. What is C-value paradox? 2
 - b. What is semiconservative replication? 2
 - c. What is pleiotrophy? Give example. 1+1
 - d. Compare between relaxed plasmid and Stringent plasmid. 1+1
- 2. Answer any two questions from the following: 2x4 = 8**
- a. Write about the molecular mechanism for formation of Barr body. State two functions of centro mere. 2+2

(2)

b. What are allele frequency and genotype frequency? White wool is dependent upon a dominant allele B and black wool is upon its recessive allele b. Suppose that a sample of 900 sheep of the Recombinant breed gave the following data: 891 white and 9 black. Estimate the allele frequencies. 1+1+2

c. What is meant by linked gene? How are linked genes related to crossing over? 2+2

d. Write down the general characteristics of transposable elements. Describe the differences between replicative and nonreplicative transposition. 2+2

3. Answer any one question of the following: 1x8 = 8

a. Schematically draw and describe the chromosome structure formation in details. 2+6

b. What is Epistasis? Explain it with suitable example. Compare between dominance and epistasis. 2+2+4

Group - B

Marks 20

1. Answer any two questions from the following: 2x2= 4

a. DNA acylation is essential for which purposes? From which molecule does acetyl group usually come? 1+1

b. What is RISC? 'Epigenetics cause chromosomal changes without DNA mutation' justify this statement. 1+1

c. What is attenuation? Define the function of leader peptide. 1+1

(3)

d. Write down the differences between transition and transversion.

Which type of base substitution is usually more common? $1\frac{1}{2} + \frac{1}{2}$

2. Answer any two questions from the following: 2x4 = 8

a. Describe the role of telomerase in telomere synthesis. Why in the absence of telomerase, the ends of chromosomes get progressively shorter in each replication event? 3+1

b. What is meant by catabolite repression of lacoperon in E.coli? 4

c. What assumptions one to be met for a population to be in Hardy Weinberg equilibrium? List the major forces that influence population genetics. 2+2

d. What is gene silencing? State the role of exportin 5 in the events of gene silencing. 2+2

3. Answer any one questions of the following: 1x8 = 8

a. What are temperate phages and how they can be differentiated from virulent phages? CI and cro proteins compete each other for lytic or lysogenic development. Describe Schematically. How can lytic growth be established from a prophage stage? 2+4+2

b. Briefly state about various promoters of eukaryotes. State various factors that control epigenetics. Why is DNA methylation essential for genetic expression? Discuss three major phenomena of gene regulation in Eukaryotes.

2+2+1+3