

**M.Sc. 2nd Semester Examination, 2023**

**MICROBIOLOGY**

**PAPER – MCB-202.1 & 202.2**

*Full Marks : 40*

*Time : 2 hours*

*The figures in the right hand margin indicate marks*

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

**MCB-202.1**

*(Fundamental Genetics)*

**A.** Answer any *two* questions from the following :  $2 \times 2$

1. What is linkage group ? In human how many linkage groups are present ?
2. What is Pleiotropy ?

3. What is test cross ? Mention its utility.
4. Mention the role of histone acetyl transferase and histone deacetylase in gene regulation.

**B.** Answer any *two* questions from the following :  $4 \times 2$

5. 'Conjugation is unidirectional'— Explain. State the significance of Hfr strains. What is competence ? 2 + 1 + 1
6. State the mechanisms of dosage compensation with example among different eukaryotes. 4
7. Explain complete dominance, co-dominance and multiple allelism by citing example of human ABO blood groups. 4
8. A population of sheep is in Hardy-Weinberg equilibrium. The allele for white wool (W) has an allele frequency of 0.19, and the allele for black wool (w) has an allele frequency

of 0.81. What is the percentage of heterozygous individuals in the population? State the importance of extrachromosomal DNA in prokaryotes. 2 + 2

C. Answer any *one* question from the following :  $8 \times 1$

9. What is C-value paradox? Write a brief note on site specific recombination. In pea plants, green pods (G) are dominant to yellow pods (g) and tall plants (T) are dominant to short plants (t). A scientist crosses a GgTt pea plant with a ggtt pea plant and the following offspring are produced.

Phenotype	Number of offspring
Green, tall	723
Yellow, short	749
Green, short	48
Yellow, tall	46

What is the percent of recombination frequency in this cross? 2 + 3 + 3

10. Differentiate between generalized and specialized transduction. State the importance of telomere region of chromosome. Explain recessive epistasis with suitable example. 2 + 2 + 4

**MCB-202.2**

*(Molecular Biology and Gene Regulation)*

D. Answer any *two* questions from the following :  $2 \times 2$

11. What is apo-repressor and co-repressor in tryptophan operon ?

12. What is siRNA ?

13. What is photoreactivation ?

14. Differentiate between inducible and repressible operon.

E. Answer any *two* questions from the following :  $4 \times 2$

15. State the attenuation control mechanism of trp-operon in bacteria. 4

16. Explain the lytic-lysogenic switching mechanism of bacteriophage lambda. 4
17. Write the mechanism of proof reading in DNA replication. Mention the role of DNA gyrase and DNA helicase in replication. 2 + 2
18. Write short notes on : 2 + 2
- (i) RISC
  - (ii) Mismatch repair.

F. Answer any *one* question from the following : 8 × 1

19. Describe the positive and negative control of lac-operon. 'When glucose and lactose present in the environment of *E. coli*, cell will utilizes glucose first, though they have the mechanism to utilize lactose also'— Explain. (3 + 3) + 2
20. Describe the process of Nucleotide excision repair (NER) in prokaryotes and eukaryotes. 3 + 5
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