**Reg. No. :** | | | | | | | | | | |

# Question Paper Code: U4D05

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Fourth Semester

Biotechnology

21UBT405 PRINCIPLES OF GENETICS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 2 = 20 Marks)

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| 1. | Differentiate phenotype and genotypes with specific example. | CO1- U |
| 2. | In a cross of AaBb x AaBb, what fraction of the offspring can be expected to express one of the two dominant alleles, but not both? Solve with the help of Punnett square. | CO2 -App |
| 3. | What is meant by histone proteins? How it is helpful in organizing a chromosome? | CO1- U |
| 4. | Human males are constitutionally hemizygous whereas females are functionally hemizygous. Justify the statement. | CO2 -App |
| 5. | Differentiate between conjugative and non-conjugative plasmids. | CO1- U |
| 6 | Agrobacterium is a natural vector. Comment on the statement | CO2- App |
| 7 | What is a terminal inverted repeat? Is it part of the transposon? Why is it important? | CO1- U |
| 8 | How do transposons rapidly propagate through and between species? | CO1- U |
| 9 | Distinguish gene mutations from chromosomal mutations | CO1 -U |
| 10 | Write the significance of Hardy-Weinberg equilibrium. | CO1- U |

PART – B (5 x 16= 80 Marks)

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| 11. | (a) | Explain the XX-XY, XX-XO and ZZ-ZW types of sex determination. | CO1- U | (16) |
| | | Or | | |
| | (b) | Write a summary on Non Mendalian inheritance and differentiate it with Mendalian inheritance. | CO1- U | (16) |

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| 12. | (a) | If you are working in a laboratory and you are provided with a sample of human blood to determine the chromosome number. What happens if one has an extra chromosome, 47 chromosomes? Comment on numerical chromosomal abnormalities. Discuss on the abnormality that occurs. | CO2- App | (16) |
| | | Or | | |
| | (b) | A cross between homozygous Purple flower producing long pollen (PLPL) is crossed with Red flower producing round pollen. What type of progeny will be obtained in first generation? When the first generation progeny is crossed with double recessive parent (plpl), identify the observed and expected phenotypic ratio. Based on the result, Comment on the configurations of incomplete linkage. | CO2- App | (16) |
| 13. | (a) | Explain the physical methods of gene transfer. Add a note on their advantages and disadvantages? | CO1- U | (16) |
| | | Or | | |
| | (b) | Write a brief note on process involved in lytic and lysogenic cascade repression in lambda. | CO1- U | (16) |
| 14. | (a) | IS elements are flanked by a short direct repeat. Draw a diagram, using a hypothetical target DNA base sequence as an example, to indicate how direct repeats are formed during insertion at the target site. Indicate the name of the enzymes involved in the process. | CO3- App | (16) |
| | | Or | | |
| | (b) | Transposable elements represent approximately 45% of the human genome. However these TEs are also considered as the Selfish genes. Comment on the statement. | CO3- App | (16) |
| 15. | (a) | Explain in detail about mutation and migration. How does mutation and migration change the genetic structure with example? Explain about mutation only? | CO1- U | (16) |
| | | Or | | |
| | (b) | Give a note on Hardy-Weinberg Equilibrium. Elaborate in detail about Extensions of Hardy- Weinberg equilibrium in population analysis. | CO1- U | (16) |