

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code: U4D05**

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

Fourth Semester

Biotechnology

21UBT405 PRINCIPLES OF GENETICS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1. Define law of segregation. CO1 – U
2. Figure out the reasons for selecting pea plant by Mendel for his experiments. CO1 – U
3. Distance between the genes is responsible for linkage in a chromosome. Justify the statement. CO2- App
4. Highlight the significance of centromere. CO1 – U
5. Write a note on degradative plasmids. CO1 – U
6. Plasmids are good cloning vectors. Justify the statement. CO2 –App
7. Distinguish between autonomous and non-autonomous transposable elements CO1 – U
8. What are dissociators (Ds)? CO1 – U
9. List any four beneficial effect of mutation. CO1 – U
10. Is gene mutation and chromosomal mutation same? Justify your answer. CO2–App

PART – B (5 x 16= 80 Marks)

11. (a) Two non-allelic genes influencing same trait produces a different form of character when alone, but, altogether they produce a distinct phenotype. Justify the statement considering the morphology of comb in chick. CO2-App (16)
- Or
- (b) What is a monohybrid cross? Explain the inheritance of one gene, taking height of plant as a trait in *Pisum sativum*. Work out the cross upto F<sub>2</sub> generation. CO2-App (16)

12. (a) What is karyotype? Discuss in detail about the effects on the organism when number of chromosomes is changed? CO1-U (16)
- Or
- (b) Explain in detail about chi square test for detecting Single Nucleotide polymorphism considering any example of your choice. CO1- U (16)
13. (a) When F<sup>+</sup> cell is mixed with F<sup>-</sup> cell, all F<sup>+</sup> cells are generated, but when Hfr cells are mixed with F<sup>-</sup> cell, the latter remains F<sup>-</sup> cell - Justify. CO3–App (16)
- Or
- (b) A gene encoding for a novel protein needs to be expressed in E.coli strain DH5 $\alpha$ . Develop rDNA process for this objective and explain how do you select positive recombinants? CO3– App (16)
14. (a) Transposable elements represent approximately 45% of the human genome. However these TEs are also considered as the Selfish genes. Comment on the statement. CO2– App (16)
- Or
- (b) A Bioprocess engineer wants a bacterial strain having the nature of antibiotic resistance. You as a genetic engineer, write a report helping him to develop a bacterial strain of his requirements. CO2– App (16)
15. (a) Explain in detail about mutagens, DNA mutations and their mechanism, elaborate about the types of genetic mutations. CO1 – U (16)
- Or
- (b) Give a detailed description on genetic drift. How does genetic drift cause changes in genetic structure with example? CO1 – U (16)