

2022

ZOOLOGY — HONOURS

Paper : CC-12

(Principle of Genetics)

Full Marks : 50

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer *Question no. 1* and *any four* questions from the rest.1. Answer *any five* of the following :

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| (a) What do you mean by cis-trans test? | 2 |
| (b) What are the direct and indirect effects of ionizing radiation? | 2 |
| (c) What is tandem duplication? | 2 |
| (d) Why Benzer selected rII locus for complementation study? | 2 |
| (e) Differentiate between Complete and Incomplete linkage. | 2 |
| (f) What are LINEs and SINEs? | 1+1 |
| (g) What are pseudoalleles? Give example. | 1+1 |
| (h) Give one example each for nullisomy and trisomy in human. | 1+1 |

2. Write short notes on *any four* of the following :

2½×4

- (a) Penetrance and Expressivity
- (b) Interference and coincidence
- (c) Non-disjunction of chromosome 21 in human
- (d) Role of 'XIC' in dosage compensation in human females
- (e) Alu elements
- (f) Epistasis
- (g) Haemophilia.

3. A *Drosophila* female heterozygous for the sex-linked recessive traits a, b and c were crossed to a male which was phenotypically a b c. The cross yielded following progeny phenotypes :

+ b c -	450
a + + -	450
a b c -	32
+ + + -	38
a + c -	11
+ b + -	9

Please Turn Over

- (a) Find out the genotype of the female parent.
- (b) Determine correct gene order.
- (c) Construct a linkage map of a, b, c.
- (d) Which progeny phenotypes are missing? Explain their absence. 2+2+4+(1+1)
4. (a) As per the theory of genic balance given by Calvin Bridges, mention the expected sex of the individuals with chromosome constitution as given below :
- (i) 3X : 3A, (ii) 2X : 3A, (iii) 3X : 2A, (iv) 1X : 2A.
- Justify your answer.
- (b) Write down the salient features of kappa particles in *Paramecium* sp.
- (c) Explain the transmission of kappa particles during short duration and long duration conjugation in *Paramecium* sp. with suitable diagrams. 4+2+4
5. (a) Alternative splicing plays a critical role during sex-determination of *Drosophila* sp. — Explain.
- (b) What do you mean by Hybrid dysgenesis?
- (c) Briefly describe the process of biochemical mutation detection in *Neurospora* sp. 4+2+4
6. (a) A colour blind man marries a phenotypically normal woman with no family history of colour blindness. They gave birth to a boy with klinefelter syndrome and colour blindness. Karyotypes of both parents are normal. Explain the origin of klinefelter syndrome and colour blindness in the boy.
- (b) What are transposable genetic elements?
- (c) Explain 'complementation' in the light of Benzer's rII locus experiment. 4+2+4
7. (a) Differentiate between Pericentric and Paracentric inversion.
- (b) What do you mean by alternate and adjacent segregation in a reciprocal translocation heterozygote? Explain with diagram.
- (c) Explain 'tautomeric shift'. 3+4+3
8. (a) What do you mean by primary and secondary sex determination in human?
- (b) What are IS elements?
- (c) Explain the process of mutation detection in *Drosophila* sp. by 'attached X' method. 3+2+5
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