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3 (Sem-5/CBCS) ZOO HC 2

2024

**ZOOLOGY**

(Honours Core)

Paper : ZOO-HC-5026

**(Principles of Genetics)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Answer the following questions as directed :  
 $1 \times 7 = 7$ 
  - (a) Which law of Mendel's is also known as 'purity of gametes' ?
  - (b) Phenylketonuria is due to the presence of lethal gene/pleiotropic gene/homeotic gene.  
(Choose the correct answer)

Contd.



- (c) Translocation involves exchange of segments between non-homologous chromosomes. (State True/False)
- (d) The point at which homologous chromosomes forms a cross is called \_\_\_\_\_. (Fill in the blank)
- (e) The inactivation of X-chromosome by hyperproduction occur in \_\_\_\_\_. (Fill in the blank)
- (f) 5-bromouracil is a base analogue of cytosine/adenine/thymine. (Choose the correct answer)
- (g) The terminal inverted repeats are characteristic for each transposable elements. (State True/False)

2. Answer the following briefly :  $2 \times 4 = 8$

- (a) What is tautomerization ?
- (b) Write the differences between transformation and transduction in bacteria.
- (c) What do you mean by polygenic inheritance ?
- (d) How can the mitochondrial DNA be distinguished from nuclear DNA ?

3. Answer the following questions : (any three)

$5 \times 3 = 15$

- (a) Illustrate the structure and function of synaptonemal complex. 5
- (b) How can sex-linked mutations be detected in *Drosophila* ? Add a note on chemical mutagen.  $2+3=5$
- (c) What is dosage compensation ? Discuss the 'Genic balance theory' of sex determination.  $1+4=5$
- (d) Define cytoplasmic inheritance. Discuss the maternal effects with special reference to coiling of shell in snail.  $1+4=5$
- (e) Explain the Mendel's law of Independent assortment with suitable illustration. 5

4. (a) Define linkage. How does linkage differ from independent assortment of genes ? Describe complete and incomplete linkage with suitable examples.  $1+2+7=10$

**Or**

- (b) What is sex-linked inheritance ? Explain the X-linked inheritance phenomenon with suitable example. Add a note on sex-influenced and sex-limited traits.  $1+5+4=10$



5. (a) Explain with suitable diagram the possible structural changes in chromosome due to which alteration in phenotypes occur. 10

**Or**

- (b) What is epistasis ? Distinguish between recessive and dominant epistasis. Describe the complementary gene interaction with proper illustration. 1+3+6=10

6. (a) What are bacteriophages ? Describe the life cycle of lytic phage. Add a note on lysogenic cycle of a phage. 1+5+4=10

**Or**

- (b) What are Ac-Ds elements ? Why transposons are sometimes referred to as "Jumping genes" ? Give an account of different types of Prokaryotic and Eukaryotic transposons. 1+1+8=10