

**2025**

**( FYUGP )**

**( 6th Semester )**

**ZOOLOGY**

**( MINOR )**

**Paper : ZOO/M6**

**( Principles of Genetics )**

**Full Marks : 75**

**Pass Marks : 40%**

**Time : 3 hours**

**( PART : B—DESCRIPTIVE )**

**( Marks : 50 )**

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

- 1. Describe the principles of Mendelian inheritance. 10**

**Or**

**Write notes on : 5+5=10**

**(a) Epistasis**

**(b) Pleiotropy**



2. What is crossing over? Explain the molecular mechanism of crossing over. 2+8=10

*Or*

Describe in detail the process of somatic cell hybridization. 10

3. Describe the various types of gene mutation. 10

*Or*

Explain the molecular mechanism of mutation in relation to UV light and chemical mutagens. 10

4. Write a note on sex-linked chromosomal abnormalities. 10

*Or*

Define polygenic inheritance. Write a note on criteria for extra chromosomal abnormalities. 2+8=10

5. Write notes on : 5+5=10

(a) Transduction

(b) Conjugation

*Or*

What are transposable elements? Write a note on transposons in bacteria. 2+8=10

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**( Principles of Genetics )**

**( PART : A—OBJECTIVE )**

**( Marks : 25 )**

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**I. Put a Tick (✓) mark against the correct answer in the brackets provided : 1×15=15**

1. The expected ratio for dominant epistasis is

(a) 9 : 3 : 4 ( )

(b) 9 : 6 : 1 ( )

(c) 12 : 3 : 1 ( )

(d) 12 : 2 : 2 ( )

2. Y-linked genes are also known as

(a) holandric genes ( )

(b) diagenic genes ( )

(c) hologenic genes ( )

(d) diandric genes ( )



3. A marriage between normal visioned man and colourblind woman will produce offsprings which are

- (a) colourblind sons and 50% carrier daughters ( )
- (b) 50% colourblind sons and 50% carrier daughters ( )
- (c) normal males and carrier daughters ( )
- (d) colourblind sons and carrier daughters ( )

4. Crossing over takes place in

- (a) pachytene stage of prophase I ( )
- (b) zygotene stage of prophase I ( )
- (c) diplotene stage of prophase I ( )
- (d) diakinesis stage of prophase I ( )

5. Cytological basis of crossing over was first noted in *Drosophila* by

- (a) McClintock ( )
- (b) Creighton ( )
- (c) Stern ( )
- (d) Janssen ( )



6. Recombination frequency

- (a) is the measure of actual distance between genes ( )
- (b) tends to be lower near centromere ( )
- (c) can be used to prepare linkage maps ( )
- (d) All of the above ( )

7. Substitution of a purine base with a pyrimidine base is known as

- (a) deletion ( )
- (b) transition ( )
- (c) addition ( )
- (d) transversion ( )

8. Numerical chromosomal aberrations are

- (a) aneuploidy ( )
- (b) euploidy ( )
- (c) diploid ( )
- (d) Both (a) and (b) ( )

9. Addition or deletion of bases causes which kind of mutation?

- (a) Transversion ( )
- (b) Frameshift mutation ( )
- (c) Transition ( )
- (d) Transcription ( )



10. The sex of *Drosophila* is determined by
- (a) the number of *X* chromosomes divided by the number of autosome sets ( )
  - (b) chromosomes *X* and *Y* ( )
  - (c) proportion of *X* chromosome pairs to autosome pairs ( )
  - (d) whether or not the egg is fertilised and develops parthenogenetically ( )
11. Which of the following is a classic example of polygenic inheritance?
- (a) Skin colour in humans ( )
  - (b) Blood groups ( )
  - (c) Flower colour in peas ( )
  - (d) Stem height in peas ( )
12. Which of the following is incorrect about 'petite mutants'?
- (a) The mutation refer to the small size of yeast colony ( )
  - (b) They cannot carry out oxidative phosphorylation ( )
  - (c) They are primarily inherited through parental parent ( )
  - (d) It is caused by mutations in the mitochondrial DNA ( )



13. Transfer of genetic material from the donor to recipient bacterium through cell contact is termed as

- (a) transduction ( )
- (b) recombination ( )
- (c) conjugation ( )
- (d) transformation ( )

14. Transduction was discovered by

- (a) Zinder and Lederberg ( )
- (b) Ivanovsky ( )
- (c) Griffith ( )
- (d) Avery et al. ( )

15. Transposable elements are known as

- (a) mobile elements ( )
- (b) jumping genes ( )
- (c) transposons ( )
- (d) All of the above ( )



( 6 )

II. Write short notes on any *five* of the following :  $2 \times 5 = 10$

1. Incomplete dominance



( 7 )

2. Multiple alleles



( 8 )

### 3. Recombination frequency



#### 4. Aneuploidy



( 10 )

5. Difference between linkage and crossing over



6. Transformation

7. Elements in the system



7. P elements in *Drosophila*



## 8. Bacteriophage

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