

This question paper contains 4 printed pages.]

Your Roll No.

1448

A

B.Sc. (Hons.)/I

MICROBIOLOGY—Paper IV

(Concepts of Genetics)

(Admissions of 2004 and onwards)

Time : 3 Hours

Maximum Marks : 60

(Write your Roll No. on the top immediately

on receipt of this question paper.)

Attempt any five questions in all.

Question No. 1 is compulsory.

All questions carry equal marks.

1. (a) Define the following terms (any **eight**) : $1 \times 8 = 8$

(a) Inbreeding depression

(b) Pedigree

(c) Pseudo alleles

(d) Heritability

(e) Split genes

(f) Criss-cross inheritance

(g) Heterosis

(h) Semidominance

(i) Silent mutation

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(2)

(b) Write the contributions of following scientists

(any *four*) :

$$1 \times 4 = 4$$

- (a) T. H. Morgan
- (b) Elizabeth Blackbush
- (c) Wilhelm Johansen
- (d) William Bateson
- (e) S. Benzer

2. Differentiate between the following (any *four*) :

$$3 \times 4 = 12$$

- (a) Paracentric and Pericentric inversion
- (b) LINES and SINES
- (c) Penetrance and expressivity
- (d) Epistasis and Dominance
- (e) Sex linked and sex limited gene expression.

3. (a) What role does meiosis play in the evolutionary process? 3

(b) Describe CIB method given by H. J. Muller. 3

(c) Comment on the genome organisation of *t*-RNA. 3

(d) Why *Mus Musculus* is used as a model organism in Genetic studies? 3

4. Write short notes on following (any *four*) : 3 × 4 = 12

- (a) Gynandromorphs
- (b) Mitotic recombination
- (c) Centromere
- (d) Genetic balance theory
- (e) Genomic Imprinting

5. (a) Write the mutagenic effect of following agents :

$$2 \times 2 = 4$$

— Ethyl methane sulfonate

— Hydroxylamine

- (b) The recessive allele k (kidney shaped eyes instead of wild type round), c (cardinal colored eyes instead of wild type red) and e (ebony body instead of wild type gray) identify 3 genes on chromosome 3 of *Drosophila*. Females with kidney shaped, cardinal colored eyes were mated with ebony males. The F_1 was wild type. When F_1 females were test crossed with $kk\ cc\ ee$ males following progeny phenotypes were obtained :

k	c	e	3
k	c	+	876
k	+	e	67
k	+	+	49
+	c	e	44
+	c	+	58
+	+	e	899
+	+	+	4
Total			<u>2000</u>

- (i) Determine the order of genes and the map distance between them. 2
- (ii) Draw the chromosomes of the parents and F_1 . 2
- (iii) Calculate interference and say what you think of its significance? 2

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(4)

- (c) What blood types could be observed in children born to a woman who has blood type M and a man who has blood types MN? 2
6. (a) How do *Drosophila* compensate for different number of X chromosomes in 2 sexes? 3
- (b) Identify the sexual phenotypes of following genotypes in human beings :
XO, XXX, XXY, XYY
Also tell the No. of Barr bodies in each. 3
- (c) What is meant by multifactorial traits? 3
- (d) Comment on infectious heredity in *Paramecium*. 3