

2008**M.Sc.****1st Semester Examination****ZOOLOGY****PAPER—Z-104****Full Marks : 40****Time : 2 Hours**

*The figures in the right-hand margin indicate full marks.
Candidates are required to give their answers in their
own words as far as practicable.*

Illustrate the answers wherever necessary.

Group—A**(Immunology)**

1. Answer any *two* questions : 2×2
 - (a) "All Immunogens are antigen but some antigens are not immunogen." — Explain.
 - (b) What do you mean by Titer?
 - (c) What is Cytotoxic T-cell?
 - (d) What is booster dose?

2. Answer any *two* of the following : 4×2
 - (a) Define adjuvant. State its mode of action. 1+3
 - (b) Enumerate the structure and function of MHC class II. 4

(Turn Over)

(c) Distinguish between Southern blotting and Western blotting hybridization. 4

(d) Discuss primary and secondary immune response with suitable illustration. 4

3. Answer any one of the following : 8×1

(a) (i) Define Antibody. Describe briefly the structure and biological function of the isotype of antibody which is present in a highest concentration in blood.

(ii) What is agretope ?

(iii) Mention the functional significance of psoriasin.

$$\left(\frac{1}{2}+3+3\right)+1+\frac{1}{2}$$

(b) (i) What is the difference between Apoptosis and Necrosis ?

(ii) Add a note on endocytic pathway for Antigen (Ag) processing. 3+5

Group—B**(Cytogenetics)**

Answer any two from question 1 and 2 and any one from the question 3 :

1. (a) State the significance of inserting LINE in causing a disease in human being.
- (b) What is a transducing retroviruses ? Give an example.
- (c) Which of the following mutations might result in an oncogene ?
- (i) a deletion in the entire coding region of a protooncogene.
 - (ii) a point mutation.
 - (iii) the introduction of a premature stop codon.
 - (iv) a deletion in an enhancer that lies 3' to the coding region.
- (d) Why HIV-1 is considered as a nononcogenic retrovirus ? 2×2

2. Answer any two questions : 4×2

- (a) With the technique of interrupted mating four *Hfr* strains were tested for the order in which they transmitted a number of different genes to an *F*⁻ strain. Each *Hfr* strain was found to transmit its genes in a unique order, as shown in the

accompanying table (only the first six genes transmitted were scored for each strain).

Order of Transmission	<i>Hfr</i> strain			
	1	2	3	4
First	O	R	E	O
	F	H	M	G
	B	M	H	X
	A	E	R	C
Last	E	A	C	R
	M	B	X	H

What is the gene order in the original strain from which these *Hfr* strains were derived? Indicate in your diagram the origin and polarity of each of the four *Hfr*s.

- (b) Which one is called the masterbreak of the cell cycle? How does it work?
- (c) In *Drosophila*, the eye colours *white*, *cherry* and *vermillion* are all sex linked and recessive. *White-eyed* females crossed with *vermillion-eyed* male produce *white-eyed* male and *red-eyed* females. A *white-eyed* female crossed with a *cherry-eyed* male produces *white-eyed* males and *cherry-eyed* females. Which of the genes appear to be allelic?
- (d) Observe the table and estimate the frequencies of all possible genotypes :

Phenotypes	Observed frequencies
A	79,334
B	16,280
AB	5,781
O	88,782

Total = 1,90,177

3. (a) Three different strains of bacteria were used to make conjugate on experiment with an F^- strain that is constant for all of the genes listed below. The time in minutes at which point the wild type genes entered the recipient bacteria are also given. Diagram the bacterial chromosome with the arrangement of the genes in their correct order : 1×8

	<i>Hfr</i> P	<i>Hfr</i> K	<i>Hfr</i> R
gal ⁺	11	67	70
thr ⁺	94	50	87
xyl ⁺	72	29	8
lacI ⁺	2	58	79
his ⁺	38	94	43

(b) The table below, shows the complementation results of 14 mutants of *E. Coli* in which '+' indicates complementation of '-' non-complementation :

TABLE

Mutants	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	-	+	+	+	-	+	+	-	-	+	+	+	+	-
2	+	-	-	-	+	+	+	+	+	+	+	-	+	-
3	+	-	-	-	+	+	+	+	+	+	+	-	+	-
4	+	-	-	-	+	+	+	+	+	+	+	-	+	-
5	-	+	+	+	-	+	+	-	-	+	+	+	+	-
6	+	+	+	+	+	-	-	+	+	-	-	+	-	-
7	+	+	+	+	+	-	-	+	+	-	-	+	-	-
8	-	+	+	+	-	+	+	-	-	+	+	+	+	-
9	-	+	+	+	-	+	+	-	-	+	+	+	+	-
10	+	+	+	+	+	-	-	+	+	-	-	+	-	-
11	+	+	+	+	+	-	-	+	+	-	-	+	-	-
12	+	-	-	-	+	+	+	+	+	+	+	-	+	-
13	+	+	+	+	+	-	-	+	+	-	-	+	-	-
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Excluding mutant 14, show with proper reason, how many complementation groups are there, and which mutants are in which group?