M.Sc. 1st Semester Examination, 2012

ZOOLOGY

PAPER – ZOO- 104

Full Marks : 40

Time : 2 hours

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Write the answers to questions of each Group in separate books

GROUP – A

(*Immunology*)

1. Answer any *two* of the following : 2 × 2

(*a*) What is NK cell ? Mention its function.

(*b*) What do you mean by tolerance ?

(*c*) State the function of CLIP in antigen processing.

(*d*) Mention the advantages of ELISA over RIA.

2. Answer any *two* of the following : 4 × 2

(*a*) Define Adjuvants with example. State its mode of action. 1 + 3

(*b*) Mention the role of skin as anatomical barrier in Innate Immunity. Write the function of IgA. 3 + 1

(*c*) Compare the properties of peptides interact with MHC class I and class II. 4

(*d*) Distinguish between (any *two*) : 2 + 2

(*i*) Primary lymphoid organ and secondary lymphoid organ.

(*ii*) Variolation and Vaccination

(*iii*) Apoptosis and Necrosis.

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

(*a*) Write the principle of Western Blotting Hybridization. How this technique differs from Southern Blotting Hybridization. Mention the application of Western Blotting Hybridization. 2 + 5 + 1

(*b*) Enumerate the mechanism of Endogenous antigen processing and presentation. State the role of CDI in non protein antigen presentation. 6 + 2

GROUP – B

(*Cytogenetics*)

4. Answer any *two* of the following : 2 × 2

(*a*) A cross is made between Hfr arg^+ bio^+ leu^+ × F^- arg^- bio^- leu^-. Interrupted mating show that arg^+ enters last. The following number of individuals are found for each genotype :

arg^+ bio^+ leu^+ 320
arg^+ bio^+ leu^- 8
arg^+ bio^- leu^+ 0
arg^+ bio^- leu^- 48

What is the gene order ?

(*b*) Which of the population is in Hardy-Weinberg equilibrium.

	AA	*Aa*	*aa*
I	·40	·40	·20
II	·25	·50	·25

(*c*) Which of the following mutations might result in an oncogene ?

(*i*) A deletion in the entire coding region of a proto-oncogene.

(*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*) What is the difference between neutral mutation and silent mutation ?

5. Answer any *two* of the following : 4 × 2

(*a*) In a generalized transduction system the donor is pur^+ nad^+ pdx^- and the recipient is pur^- nad^- pdx^+. The donor allele pur^+ is initially selected. The results follows :

Genotype	No. of Colonies
nad^+ pdx^+	3
nad^+ pdx^-	10
nad^- pdx^+	24
nad^- pdx^-	13
	50

(*i*) What is the cotransduction frequency for pur and nad ?

(*ii*) What is the cotransduction frequency for pur and pdx ?

(*b*) Three different strains of bacteria were used to make conjugate on expt. with F^- strain. The time in minutes at which point genes entered are also given. Diagram the bacterial chromosome with the arrangement of the genes in their correct order :

	Hfr P	Hfr K	Hfr R
gal^+	11	67	70
thr^+	94	50	87
Xyl^+	72	29	8
lae^+	2	58	79
his^+	38	94	43

(*c*)

Population	P_A	Q_B	r_0	$P_A + Q_B + r_0$
English	0·268	0·052	0·681	1·001
Hindus	0·149	0·291	0·560	1·000

From the allele frequencies given in above table, determine the frequencies of the four ABO blood groups among them.

(*d*) How membrane-associated *G* proteins are activated as a signaling cascade by the binding of the growth factor to the cell surface receptor ?

6. Answer any *one* of the following : 8 × 1

(*a*) (*i*) Five different *r*II deletion strains of phage T4 were tested for recombination by pairwise crossing in *E.Coli B*. The following results were obtained, where + = r^+ recombinants produced and O = no r^+ recombinants produced.

	A	B	C	D	E
E	O	+	O	+	O
D	O	O	O	O	
C	O	O	O		
B	+	O			
A	O				

Draw a deletion map compatible with these data.

(*ii*) Seven different point mutants (1 to 7) of phage T4 were tested for recombination crosses in *E. Coli B* with the five deletion

strains described above. The folllowing results were obtained where + = r^+ recombinants produced and O = no r^+ recombinants produced,

	A	B	C	D	E
1	O	+	O	+	+
2	+	O	O	+	+
3	O	+	O	+	O
4	+	+	O	+	O
5	+	O	O	O	+
6	O	+	O	O	+
7	+	+	O	O	+

In which region of the map can you place the seven point mutations ? 8

(*b*) (*i*) State the role of MGMT in single step DNA repair mechanism.

(*ii*) Briefly describe the mechanism of mutation induced by intercalating agent.

(*iii*) State the role of p21 protein in cell cycle.

3 + 3 + 2