

Total pages: 3

PG CBCS
M.Sc. Semester-I Examination, 2020
ZOOLOGY
PAPER: ZOO 104

Full Marks: 40

Time: 2 Hours

Write the answer for each unit in separate sheet

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.

Group-104.1

(Marks: 20)

(Cell biology)

1. Answer two questions of the following: **2x10=20**

- a. Why is fluidity important in membrane structure? Write a short note on fluid mosaic model of Plasma membrane. Briefly discuss about the cholesterol synthesis. 1+3+6
 - b. What is active transport? What type of protein is involved in active transport? Describe how the sodium-potassium pump functions. What is the electrochemical gradient? 1+2+5+2
 - c. What is G protein? What is the function of G protein coupled receptors? How does GPCR activate G protein? 2+6+2
 - d. What is G_o phase in cell cycle? What are the modes of regulation of Cyclin-Cdk complexes? Describe the molecular mechanism of entering a cell from G1 to S-phase. 2+2+6
 - e. Describe the role of IP₃ in causing a rise in cytosolic Ca²⁺ concentration. How do cells restore resting levels of cytosolic Ca²⁺? What is the principal function of DAG? 5+ 3+ 2

Group-104.2

(Marks: 20)

(Cytogenetics)

2. Answer two questions of the following:

$$2 \times 10 = 20$$

- a. In a transduction experiment, the donor was c+ d+ e+ and the recipient was c d e. Selection was for c+. The four classes for transductants from this experiment are shown in the following table;

Class	Genetic composition	number of individuals
1	c+d+e+	57
2	c+d+e	76
3	c+de	365
4	c+de+	2
	Total	500

- i. Determine the cotransduction frequency of c+d+? 4+4+2
 - ii. Determine the cotransduction frequency of c+e+?
 - iii. Which of the cotransduction frequencies calculated in a and b represents the greater actual distance between genes?

 - b. The following data are ABO phenotypes from a population sample of one hundred persons. Determine the frequencies of three alleles type A -7, type B- 72, type AB - 12,type O- 9. Is the population in Hardy-Weinberg proportions

 - c. The amber mutants of phage T4 are conditional lethal mutants. That grows on *E. coli* strain CR₆₃, but is lethal on *E. coli* strain B. An amber mutant almost never exhibits intragenic complementation with any other amber mutant; for this problem, assume that no intragenic complementation occur between any of the mutants involved. The following results were obtained when eight amber mutants were analyzed for complementation by infecting the restrictive host (*E. coli* strain B) with each possible pair of mutants. The results of mixed infections by pairs of mutants are shown as 0 if no progeny are produced, and as + if progeny phage resulted from the infection with that particular pair of mutants.

Mutants	1	2	3	4	5	6	7	8
8	+	+	+	+	+	+	0	0
7	+	+	+	+	+	+	0	
6	+	+	+	+	+		0	
5	0	+	0	+	0			
4	+	+	+		0			
3	0	+	0					
2	+	0						
1	0							

- i. Indicate eight amber mutations are located in how many different genes? 8+2
- ii. Which mutations are located in the same gene or genes? 8+2
- d. What do you mean by retro virus? Write the genome organization of Rous Sarcoma Virus. 2+3+5
- Describe briefly the mechanism of integration of RSV to its host.
- e. Four different Hfr derivatives with a different origin and possibly a different direction of transfer were examined in interrupted mating experiments and were found to transfer chromosomal genes at the time shown in accompanying table. Draw a circular genetic map with position O showing the order of genes and the distance (in minute) between adjacent genes.

Genetic marker

Hfr	his	lac	leu	lip	phe	pro	pyrD	terC	TonA
W	-	20	-	11	-	-	3	-	-
X	-	-	18	-	-	-	31	-	20
Y	-	13	-	22	-	6	-	2	-
Z	19	-	-	-	12	4	-	8	-

10
