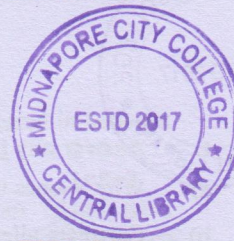


PG (NEW) CBCS
M.Sc. Semester-I Examination, 2019
ZOOLOGY
PAPER: ZOO-104
(Cell Biology & Cytogenetics)

**Full Marks: 40****Time: 2 Hours**

The figures in the margin indicate full marks.

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

Illustrate the answers whenever necessary.

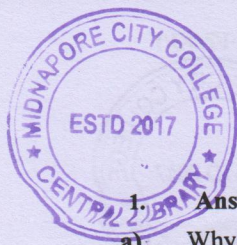
Use separate Answer Scripts for Group-A & Group-B

Group A

(Cell Biology)

1. Answer two questions of the following: 2×2=4
 - a) What do you mean by GPI anchored protein?
 - b) Why fluidity of the membrane is important?
 - c) What is cadherins?
 - d) State the significance of cholesterol molecules in biomembrane.
2. Answer any two of the following questions: 2×4=8
 - a) What do you mean by active transport ? How does Na⁺ - k⁺ - ATPase pump work? 2+2=4
 - b) What do you mean by ECM? How does it Work? 2+2=4
 - c) Explain the structure and functional significance of microtubule-associated motor proteins.
 - d) What do you mean by integral protein and extrinsic protein? Which types of lipids are present in cell membrane? 2+2=4
3. Answer any one of the following questions: 1×8=8
 - a) What are cell cycle regulators? How does MPF regulate cell cycle? Why G1 Check point is considered especially significant? 2+4+2=8
 - b) What are second messengers in cellular signal transduction? Describe the Map kinase pathway of signal transduction and its significance. 2+6=8

(Turn Over)



(2)

Group B**(Cytogenetics)**1. Answer any two questions of the following: 2×2=4

- a) Why V-oncs induce tumors where as normal c-oncs do not?
- b) Calculate allele frequency of L^M and L^N from the population $L^M L^M$ 406, $L^M L^N$ 744, $L^N L^N$ 332.
- c) Name two tumor suppressor gene.
- d) Trans genotype $rU^{+}/+$ rV produce burst size of 258 and $rU^{+}/+$ rY produce no burst. Predict rU , rV and rY are present same/alternate cistron.

2. Answer any two of the following questions: 2×4=8

- a) In E.coli, four Hfr stains donate the following markers, shown in the order donated:

Strain 1:	M	Z	X	W	C
Strain 2:	L	A	N	C	W
Strain 3:	A	L	B	R	U
Strain 4:	Z	M	U	R	B

All these Hfr stains are derived from the same F^+ strain. What is the order of these markers on the circular chromosome of the original F^+ ? 4

b)

	Genotype		
Population I	$AA=0.3$	$Aa=0.0$	$aa=0.7$
Population II	$AA=0.2$	$Aa=0.2$	$aa=0.6$

Which of the above population is in HWE? Explain in favour of your answer.

- c) Mention the role of Ras protein in a signalling cascade with proper diagram.
- d) In an experiment E.Coli was infected with two strains of T-4 bacteriophages, one was mutant for rapid lysis (r) minute (m) and turbid (tu) and the other was wild type for all these genes. The lytic products of this mixed infection were plated and classified as follows:

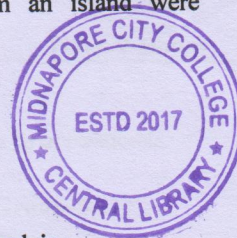
Genotype	Number of plaques
$Rmtu$	3467
$r^+ m^+ tu^+$	3729
$rmtu^+$	853
$r^+ mtu^-$	162
$r^+ mtu^+$	520
$rm^+ tu$	474
$rm^+ tu^+$	172
$r^+ m^+ tu$	965

(Turn Over)

(3)

- i) Is the r gene closer to m gene on the tu gene?
 ii) As a matter of linkage, which gene is probably located in between the other two? $2+2=4$
3. Answer any one of the following questions: $1 \times 8 = 8$
- a) The ABO blood group of 1000 individuals from an island were determined and the following data are obtained.

Blood type	Number of people
A	430
B	140
AB	50
O	380



Is this population in Hardy-Weinberg equilibrium? Explain.

- b) i) Seven deletion mutants within the A cistron of rII region of phage T₄ were tested in all pairwise combinations for wild type recombinants. In the adjacent table of results + = recombination, 0 = no recombination. Construct a topological map for these deletions. 5

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

- ii) Assume that the mutants (histidine) were examined. Cis heterozygotes were able to grow in the absence of histidine. The trans heterozygotes yielded two different responses; Some of them grow in absence of histidine, Some did not. Results are given below: + indicates growth, 0 indicates no growth.

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

How many genes would they have defined? Which mutation would have been in the same genes? $1+2$
