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PG (NEW) CBCS

M.Sc. Semester-I Examination, 2018

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 from the following: **2×2=4**

a) State the function of integrin.

b) What do you mean by GPI anchored protein?

c) What is secondary active transport?

d) What is autocrine signaling?

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

a) Illustrate the mechanism of step wise activation of Ca^{+2}/ calmodulin dependent protein kinase.

b) Describe structure and significance of any two cell adhesion molecules (CAMs) **2+2=4**

c) Differentiate between different types of pumps for transporting solutes across membrane. What is coupled transport? **3+1=4**

d) What are the different types of collagen fibres? Write a note on biogenesis of collagen fibre. **2+2=4**

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

a) **i)** Illustrate the mechanism of plus end directed and minus end directed microtubular motor transport in eukaryotic cell.

ii) What is GAGS? Mention its types. **5+1+2=8**

b) **i)**What is G_0 phase in cell cycle?

ii) What are the modes of regulation of cyclinCdk complexes?

iii) Describe the molecular mechanism of entering a cell from G1 to S-phase. (Flow chart/word diagram). **2+2+4=8**

(Turn Over)

Group B

(Cytogenetics)

1. Answer two questions from the following: **2×2=4**

a) In a $F^+ \times F^-$ cross, how many F^+ cells will you expect?

b) Name two tumor suppressor proteins that promote apoptosis.

c) The incidence of recessive albinism is 0.0004 in a human population. What is the frequency of the recessive allele in case of random mating?

d) Distinguish between V src and C src.

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) The amber mutants of phage T4 are conditional lethal mutants. That grows on E. colistrain CR_{63}, but are lethal on E. colistrainB.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 O 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							

(Turn Over)

i)These data indicates that the eight amber mutations are located in how many different genes?

ii) Which mutations are located in the same gene or genes.**2+2=4**

c) Find out the order of cheA, che B, eda and snp D from the following data with proper explanation.

Markers	% Co transduction
che A- eda	15
che A – sup D	5
che B – eda	28
cheB – snp D	2.7
eda – snp D	0

d) The human MN blood type antigens are determined by two co-dominant alleles L^M and L^N. The MN blood types and corresponding genotypes of 398 from a village are given below.

Phenotype	Genotype	Number
MM	L^ML^M	182
MN	L^ML^N	172
NN	L^NL^N	44

Calculate genotypic and allele frequency at MN locus for the population. **4**

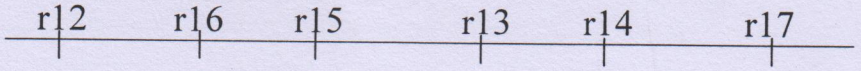
3. Answer any one of the following questions: **1×8=8**

a) Given the following map with point mutants and given the data in the following tables draw a topological representation of deletion mutants r21, r22, r23, r24, r25.

+ = r^+ recombinants are obtained

- = r^+ recombinants are not obtained.

Map –



	r11	r12	r13	r14	r15	r16	r17
r21	0	+	0	+	0	+	+
r22	+	+	0	0	+	+	0
r23	0	0	0	+	0	0	+
r24	+	+	0	0	+	+	+
r25	+	+	0	0	0	+	+

b) In European land snail, multiple alleles at a single locus determine shell color. The allele for brown (C^B) is dominant to pink (C^P)and yellow (C^Y). The dominance hierarchy is $C^B>C^P>C^Y$. In one population sample, the following color phenotypes are recorded.

Brown 236

Pink 231

Yellow 33

Assuming that this population is in HWE. Calculate the frequencies C^B, C^P and C^Y and calculate the expected values.