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PG CBCS
M.Sc. Semester-I Examination, 2022
Department of Zoology
PAPER: ZOO 104
(Cell biology and Cytogenetics)

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

Write the answer for each unit in separate sheet

ZOO 104.1

CELL BIOLOGY

GROUP-A

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

a) What is meant by Lipid Raft?
b) What do you mean by GPI anchored protein?
c) State the role of Cdc 25 in cell cycle regulation.
d) How does cAMP regulate the action of Protein kinase A (PKA)?

GROUP-B

2. Answer any TWO from the following questions: **2×4=8**

a) Why fluidity is important in membrane structure? Write a short note on fluid mosaic model of Plasma membrane. 1+3=4
b) What are the main functions of Tight Junctions? Mention the roles of Rod Photoreceptors. 2+2
c) What is the structure of microtubule? Mention its role in cell division. 2+2
d) Explain how CDK activity is controlled or modulated by the following proteins: 4
   i. Cyclin
   ii. CAK
   iii. Wee 1
   iv. APC

GROUP-C

3. Answer any ONE from the following questions: **1×8=8**

a) What do you mean by G protein coupled receptors? How does GPCR activate G protein? 2+6
b) What is active transport? Describe how the sodium-potassium pump functions. What is the electrochemical gradient? 1+5+2

P.T.O.

ZOO 104.2
CYTOGENETICS

GROUP-A

4. Answer any TWO from the following questions: **2×2=4**

a) What is the implication of Cis-Trans complementation test?

b) What is the gene frequency of L^M of a population consists of L^M L^M300 L^M L^N400 L^N L^N100?

c) Write names of two tumor suppressor genes?

d) What roles does Ras- GTP play in intracellular signaling that makes it a proto-oncogene?

GROUP-B

5. Answer any TWO from the following questions: **2×4=8**

a) In E. coli, four Hfr strains donate the markers shown in the order given:

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 of these Hfr strains are derived from the same F^+ Strain. What is the order of these markers on the circular chromosome of the original F^+.

b) Mention the order cheA, cheB, eda and supD from the following data

Markers	% Co transduction
cheA-eda	15
cheA-supD	5
cheB-eda	28
cheB-supD	2.7
eda-supD	0

c) In a Hardy-Weinberg equilibrium population, out of 100 people 17 have A type blood group, 17 have B type, 2 have AB type and 64 have O type. Calculate the allelic frequencies.

d) All puz/pur alleles result in defective enzyme P and map at one genetic loens. A complementation test among six mutant pur strains produce the following results where + indicates complementation and – indicate no complementation

	1	2	3	4	5	6
1	-	-	-	-	+	-
2	-	-	-	-	+	+
3	-	-	-	-	-	-
4	-	-	-	-	-	+
5	+	+	-	-	-	+
6	-	+	-	+	+	-

GROUP-C

6. Answer any ONE from the following questions: **1×8=8**

a) You cross a number of deletion mutations in all possible combinations in *E. coli* B and plate them on *E. coli* K 12 (λ) to determine whether r^+ recombinants are produced. r^+ recombinants indicate that the mutations can recombine and so, if they are deletions they must be non-overlapping. The results are given in the accompanying table in which – indicate an rII mutation and + indicate the formation of r^+ recombinant progeny in the cross. Assemble a deletion map for these mutations using a line to indicate the DNA segment that is deleted in each segment.

	a	b	c	d	e	f
a	-	-	-	-	-	-
b		-	-	+	+	-
c			-	+	-	+
d				-	-	+
e					-	+
f						-

b) Using bacteriophage p 22 you performed a three factor cross in *Salmonella typhimuriu.* The cross was between as Arg^- Leu^- His^- recipient bacterium and bacteriophage p 22 which was grown on an Arg^+ Leu^+ His^+ strain. Ypu selected for 1000 Arg^+ transductants and tested them on several selective media. By replica plating you obtained the following results:

Arg^+ Leu^- His^- = 585
Arg^+ Leu^- His^+ = 300
Arg^+ Leu^+ His^+ = 114
Arg^+ Leu^+ His^- = 1

i) What is the order of the three markers?
ii) What are the co-transduction frequencies? 4 + 4

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