2022
Zoology
[First Semester]
Paper - 104(A)
(Cell Biology)
Full Marks : 40
Time :   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.
Illustrate the answers wherever necessary.

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

    a) Write the name of cyclin and CDKs in mammatian cell throughout the cell cyele according to stage specific.

    b) What roles do the SH2 and SH3 domains play in the function of GRB2?

    c) How do ionic and non-ionic detergents differ in their

ability to distrupt biomembrane structure?

d) Schematically represent AKt protein signalling in cell proliferation.

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

a) How Rb gene regulates cell cycle? Explain it with the help of diagram and flow chart.   4

b) Explain the role of the ABC protein in development of MDR (multidrug resistivity). What are P-type AT Pase?   3+1

c) Define scatchard plot of Ligand reseptor interaction. Suppose the association constant for ligand binding is 10^7M. Determine the concentrator of ligand required for occupying 10% of receptors.   1+3

d) The membrane potential in animal cells, depends largely on resting K^+ channels. How does K^+ channel achieve selectivity for K^+ versus Na^+, which is smaller than K^+?

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

a) "Receptor – mediated activation of GPCR occurs within few seconds of ligand binding." –Justify the

following statement using FRET at 440 nm. Schematically explain the role of adrenaline in maintenance of blood sugar level. Explain the role of DAG and IP3.   3+3+2

b) (i) Explain how FRET could be used to monitor the association of Gas and adenylyl cyclase following activation of the epiephrine receptor. Suppose that you have isolated a mutant Gas subunit that has an increased GTPase activity. What effect would this mutation have on the G protein and the effector protein?

(ii) Name four different proteins that facilitate the modification or folding of secretory proteins within the lumen of the ER.

(iii) What is lipid rafts?   4+2+2

2021
Zoology
[First Semester]
Paper - 104 (B)
(Cytogenetics)

Time :   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.
Illustrate the answers wherever necessary.

4. **Answer any two of the followings :**   **2×2=4**

a) A population has eight times as many as heterozygotes as homozygons recessive. What is the recesive allele?

b) In what sense pRB a negative relularos of E2 transcription factor?

c) In *E.Coli* four Hfr stains transfer their markers in the order shown below:

(2)

Strain 1 A B C D E
Strain 2 G H I E D
Strain 3 J K L G H
Strain 4 J A B C D

All the Hfr strains were derived from the some F^+ strain. Arrange the markers on the circular chromosome showing the origin and direction of transfer with an arrow in each care.

d) At what alleic frequency does the homozygons recessive genotype (bb) become twice as frequent as the hetrozygous genotype (Bb) in a Hondy-Weinberg population? Explain it with proper reason from the following option.

(i) 0.5 (ii) 0.4 (iii) 0.8 (iv) 0.25

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

a) Why p53 is called the guardian of all genome? Explain with proper reason.

b) All pur alleles result is defective enzyme P and map at one genetic locus. A complementation test among six mutant pur strans procedure the following results where + indicate complementation and – indicate non-

complementation.

	1	2	3	4	5	6
1	–	–	–	–	+	–
2	–	–	–	–	+	+
3	–	–	–	–	–	–
4	–	–	–	–	–	+
5	+	+	–	–	–	+
6	–	+	–	+	+	–

Draw a complementation map and comment what kind of mutant might mutant3?

c) Narrate the role of pRB in relulating the cell cycle at the G1 to S checkpoint.

d) Cystic fibrosis is a recessive disease characterized by malabsorption of food and obstruction of the bronchial tubes and other tissues. Death usually occurs by the late teens. About 4 in 10,000 new borns will suffer from cystic fibrosia. Assuming Handy-Weinburn equilibrium, what are the frequencies of the three genotypes among new borns?

6. Answer any one :   **1×8=8**

a) Following are the number of colonics at different transformant classes from a cross at trp$^+$, Itist, try$^+$ as the donor with trp$^-$, His$^-$, tyr$^-$ as the recipient :

   I) trp$^-$ his$^-$ try$^+$ = 685

   II) trp$^-$ his$^+$ tyr$^-$ = 418

   III) trp$^-$ his$^+$ tyr$^+$= 3660

   IV) trp$^+$ his$^-$ tyr$^-$ = 2660

   V) trp$^+$ his$^-$ tyr$^+$ = 107

   VI) trp$^+$ his$^+$ tyr$^-$ = 1180

   VII) trp$^+$ his$^+$ tyr$^+$ = 1194

Calculate the linkage distances and linkage map between the three loci trp, his and tyr.

b) In a certain population the frequencies of the four blood groups are :

A = 0.45

B = 0.13

AB = 0.06

O = 0.36

Find out the allele frequency.