First Semester Examination-2017

M.Sc. ZOOLOGY

Paper Code: ZOO-104

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

(Cytogenetics)

1. Answer any two question of the following: 2×2=4

a) What are genotypic difference between F^+ cells, F^+ cells and Hfr cells?

b) Red green color blindness is cause by an X-linked recessive gene. About 64 women out of 10000 are color blind. What proportion of men would be expected to show the trait.

c) Name two tumor suppressor gene inhibiting breast cancer and retinoblastoma.

d) Which of the population is in Hardy Weinberg Equilibrium.

	AA	Aa	Aa
I	0.40	0.40	0.20
II	0.25	0.50	0.25

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

a) How is E_2F and Rb related to cell cycle regulation? Elucidate the mechanism? 2+2

Hfr Strain	Markers Donated in Order
1	-Z-H-E-R- →
2	-O-K-S-R- →
3	-Z-T-I-W- →
4	-H-Z-T-I- →

b) An F^+ strain marked at 10 loci give rise spontaneously its Hfr progeny whenever the F factor becomes incorporated into the chromosome of the F^+ strain. The F factor can integrate into circular chromosome at many points. So that the various Hfr segregants transfer the genetic markers in different sequence. For any Hfr strain , the order of markers entering early can be determined by interrupted mating experiments using a waring blender. From the following data for several Hfr strains derived from the same F^+ determine the order of markers in the F^+ strain.

c) In snail, multiple alleles at a single locus determine shell color. The allele for brown (C^B) is dominant to the allele for pink (C^P) and to the yellow (C^Y). The following color phenotypes were recorded. Assuming the population is under HWE. Calculate the frequency of C^B, C^P and C^Y. **4**

Brown	**236**
Pink	**231**
Yellow	**33**

d) In a phage , a set of deletions is intercrossed in pairwise combinations. The following results are obtained.

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

Construct a deletion map from this table. 4

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

a. i). A cross is made between Hfr met^+ thi^+ pur^+ X F^- met^- thi^- pur^-. Interuprupted mating studies show that met^+ enters last. So, met^+ exconjugants are selected on medium containing thi and pur.

met^+ thi^+ pur^+	280
met^+ thi^+ pur^-	0
met^+ thi^- pur^+	6
met^+ thi^- pur^-	52

What is the gene order? What are the map distance in recombination unit? 3+2

ii). In a randomly mating , laboratory population of Drosophila 4 percent of flies have black bodies(encoded by autosomal recessive b) and 96 percent have brown bodies(the wild type ,encoded by B). If this population is assumed to be in Hardy Weinberg equilibrium. What are the allele frequencies of B and b, and the frequencies of B/B and B/b? 3

b. Propose a genetic map that is consistent that is consistent with the complementation data provided below, where m1- m7 are different point mutations and Dfa- Dfe are deletions. '+' indicates complementation occurs whereas '0' indicates no complementation. 8

	m 1	m 2	m 3	m 4	m 5	m 6	m 7
Dfa	0	0	0	+	0	0	0
Dfb	0	+	+	0	+	0	0
Dfc	0	+	+	+	0	0	+
Dfd	0	0	+	0	0	0	0
Dfe	0	+	+	0	+	+	0

Group-B

(Immmunology)

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

a). Write the function of Class-I and Class-II MHC molecule?

b). What is Natural killer cell (NK)? Mention its functions.

c). What are the advantages of ELISA?

d). Differentiate antigenicity and immunogenicity.

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

a). Describe the structure and biological functions of IgA molecule with labelled diagram. 2+2

b). What is humoral immunity & its importance? 2+2

c). What is hapten? Add a short note on Opsonization. 1+3

d). What is the role of MHC on Cheetah's population decline? 4

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

a). i). If we treat antibody with pepsin and papain, what will be the outcome?

ii). Tabulate the list of professional and non professional antigen presenting cell. 4+2+2

b). i). Differentiate Helper T- cell and Cytotoxic T- cell.

ii). What are Cytokines? Mention the role of any two cytokines.

3+2+3