POST-GRADUATE COURSE

Term End Examination — June, 2017

ZOOLOGY

Paper - 6A : Quantitative Biology and Biotechnology

Time : 2 Hours **Full Marks : 50**

(Weightage of Marks : 80%)

Special credit will be given for accuracy and relevance in the answer. Marks will be deducted for incorrect spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

1. Answer the following : $9 \times 1 = 9$

a) What is correlation coefficient ? The following data refers to recombination values obtained from two regions viz R_1 and R_2 on a chromosome of six different *Anopheles* mosquitoes.

Anopheles strain	**1**	**2**	**3**
Region - 1 (R-1)	36·7	20·0	18·3
Region - 2 (R-2)	16·2	24·3	32·3

4	**5**	**6**
34·5	20·8	30·8
10·4	36·6	15·4

Calculate correlation coefficient between two regions and comment on the result. 2 + 7

OR

b) i) State briefly the assumption of ANOVA.

ii) You are given the following data :

Variable	***X***	***Y***
Mean	47	96
Variance	64	81

Correlation coefficient (r) between X and Y = 0·3. Determine the equation of regression lines. Calculate Y when X = 50 and X when Y = 88. 3 + 6

2. Answer the following : $9 \times 1 = 9$

a) Mention the difference between colorimeter and spectrophotometer. State the application of flow cytometry in biology. 5 + 4

OR

b) State the basic concept of NMR. Mention the genetic control of apoptosis. 5 + 4

3. Answer *three* questions taking at least *one* from each unit. $6 \times 3 = 18$

Unit - I

a) State briefly about alpha decay, beta decay and gama decay with example for each case. 2 + 2 + 2

b) Describe the different steps to monitor southern blotting. 6

c) What are the major differences of thin layer chromatography and ion exchange chromatography ? What do you mean by Noah's ark blot and Northern blot ?

$3 + (1\frac{1}{2} + 1\frac{1}{2})$

Unit - II

d) Write short notes on the following : 3 + 3

i) Principles of FACS.

ii) Cryopreservation of spermatozoa.

e) Calculate the mean and standard deviation from the following data :

Class	95-105	105-115	115-125	125-135	135-145
Frequency	19	23	36	70	52

3 + 3

f) Write down the classical definition of probability. What do you mean by variance and coefficient of variance ? 3 + 3

4. Answer *two* questions taking at least *one* from each unit. $4 \times 2 = 8$

Unit - I

a) Name two fluorescent compounds used in immunofluorescence study. What is avidity ? 2 + 2

b) Write down the relation among mean, median and mode. How do you calculate standard error ? 2 + 2

Unit - II

c) State the principle and application of confocal microscopy. 2 + 2

d) What is principle of electrophoresis ? Mention the role of SDS in SDS-PAGE. 2 + 2

5. Answer *two* questions taking at least *one* from each unit. $3 \times 2 = 6$

Unit - I

a) Mention the factors which may cause deviation from Beer's law. 3

b) Write briefly about the following : $1\frac{1}{2} + 1\frac{1}{2} = 3$

i) Null hypothesis

ii) Chi-square test.

Unit - II

c) What are diamagnetic and paramagnetic shift ? $1\frac{1}{2} + 1\frac{1}{2}$

d) Describe the function of caspases in apoptosis. 3