M.Sc. 4th Semester Examination, 2024

ZOOLOGY

PAPER—ZOO-401.1 & 401.2

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

ZOO-401.1

(*Environmental Pollution and Management*)

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

(*a*) On the basis of annual rainfall, how many major types of forest can be categorized in India ?

(*b*) What is life expectancy index ?

(*c*) What is Biosafety ? Write down its significance.

(*d*) State the difference between soil silting and soil erosion .

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

(*a*) State the objectives of conservation. What is world conservation strategy ? 2+2

(*b*) Describe the advantages of biomonitoring over chemical monitoring.

(*c*) Write a note on cultural eutrophication.

(*d*) State the significance of Bioinvasion from ecological point of view.

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

(*a*) What is Human development Index (HDI) ? How is it estimated ? Calculate HDI of a country where life expectancy, education and income indicex are 6.2, 6.5, 8.1 respectively. Assess the development of that country. $2 + 4 + 1 + 1$

(*b*) What is photochemical smog ? Describe with reactions on the process of formation of the smog. $2 + 6$

ZOO-401.2

(*Biostatistics*)

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

(*a*) Write a note on different ANOVA models.

(*b*) What do you mean by 'error of inference' ?

(*c*) Provide a brief account of skewness and kurtosis.

(*d*) Let A and B be two events such that $P(A) = 1/5$ while $P(A \text{ or } B) = 1/2$. Let $P(B) = p$. For what values of p are A and B independent ?

5. Answer any *two* questions from the following : 4×2

(*a*) The shell height (X) and shell bredth (Y) of 9 shails are represented in following table. Establish a regression equation relating height (X) and breadth (Y). Estimate the shell height of the snail with the shell breadth of 3.75 mm. Correlation coefficient is 0.74.

	(X)	(Y)
Mean	3	0.59
SD	8	1.68

(*b*) The product movement r scores (r_{12}) between gill weight (X_1) in gm and trunk length (X_2) in cm was found to be 0.55 in a sample of 43 fishes. The r scores (r_{13}) between their gill weight (X_1) and body weight (X_3) in gm is 0.30. The r scores (r_{23}) between the trunk length and body weight is 0.28. Find whether or not there is a significant multiple linear correlation between the X_1 and the combination of X_2 and X_3.

Critical t scores

$t_{0.05}(40) = 2.021$; $t_{0.05}(41) = 2.020$
$t_{0.05}(42) = 2.018$; $t_{0.05}(43) = 2.017$

(*c*) Find whether there is a significant difference between the strengths of Kneejerk reflex of the following two groups :

Group I :	31	30	21	30	26	28	19	36	37		
Group II :	35	26	14	20	11	14	21	31	27	24	10

Critical t scores

$t_{0.05}(9) = 2.262$; $t_{0.05}(10) = 2.228$; $t_{0.05}(19) = 2.093$

$t_{0.05}(17) = 2.110$; $t_{0.05}(18) = 2.101$; $t_{0.05}(20) = 2.086$

(*d*) Find out the binomial probability of random occurrence of 8 male house fly in a sample of 12 drawn from a housefly population with a male female ratio of 45 : 55.

6. Answer any *one* question from the following : 1×8

(*a*) 30 bypass patients are randomly divided into four treatment groups depending on medicine applied. Folic acid in red blood cells were measured. Is there any significant effect of medicine one RBC folate ?

Group A : 12, 15, 10, 18, 11, 15, 12

Group B : 21, 25, 19, 26

Group C : 9, 8, 8, 7, 10

Group D : 20, 21, 19, 22, 24

Critical F values

$F_{0.05}(3, 18) = 3.16$
$F_{0.05}(3, 17) = 3.20$
$F_{0.05}(4, 18) = 2.93$
$F_{0.05}(4, 17) = 2.96$

(*b*) (*i*) p is the probability of 'Heads' of a coin. Let X be a random variable that takes on the value k if it takes K tosses to obtain the first 'Heads' in a sequence of coin tosses. What are possible values of X ? What is the PMF of X ?

(*ii*) The standard deviations calculated from two random samples of sizes 9 and 13 are 2.1 & 1.8 respectively. Test whether the samples are drawn from the normal population with the same S.D. ? $F_{0.05}(8, 12) = 2.85$. 4 + 4

[Internal Assessment — 10 Marks]