

**2023**

**M.Sc.**

**4th Semester Examination (CCAЕ)**

**ZOOLOGY**

**PAPER : ZOO-401.1 & 401.2**

*Full Marks : 40*

*Time : 2 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.*

**SECTION—I**

**( ZOO-401.1 )**

**( ENVIRONMENTAL POLLUTION & MANAGEMENT )**

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

(a) Differentiate point pollution from non-point pollution.

(b) Differentiate BOD from COD.

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- (c) Differentiate pollutants from contaminants.  
(d) Differentiate eco degradation from pollution.

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

$$4 \times 2 = 8$$

(a) What are oxygen demanding wastes? Briefly outline the scientific principles of primary and secondary sewage treatment processes.

$$1 + 3 = 4$$

(b) What is bio-invasion? Briefly elaborate the chemical reactions leading to form photochemical smog.

$$4$$

(c) What is carbon sequestration? Briefly discuss the process of formation of 'Acid Rain'.

$$4$$

(d) What is 'Green Movement'? Mention different steps for achieving the targets of venture.

$$4$$

3. Answer *any one* question from the following :

$$8 \times 1 = 8$$

(a) Define eutrophication. Schematically highlight different ecological consequences due to this process. Add a note on 'Sacred Groves'.

$$2 + 4 + 2 = 8$$

(b) What is sustainable development? Mention its different types. What are the different steps involved in achieving sustainable development?

$$2 + 2 + 4 = 8$$

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SECTION—II

( ZOO-401.2 )

( **BIOSTATISTICS** )

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

(a) What do you mean by frequency distribution?

(b) Elaborate the types of correlation, with graphs.

(c) State the difference between parametric and non-parametric tests.

(d) What is skewness? How do you measure skewness?  
1+1=2

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

(a) The mean and the standard deviation of a sample of size 10 were found to be 9.5 and 2.5 respectively. Later on, an additional observation became available. This was 15 and was included in the original sample. Find the mean and standard deviation of all 11 observations.

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- (b) Compute the regression equation of calcitonin content (CC) of thyroid gland of rats on the thyroxine secretion rate (TAR) using the following data :

No of rats = 30, Mean CC = 390 mU/gland (SE = 11.00); mean TSR = 1.2  $\mu$ g/100g; body weight (SE = 0.04  $\mu$ g); product moment  $r = -0.298$ . 4

- (c) In a group of 163 students of Zoology, the product moment  $r$  values between intelligence test scores ( $x_1$ ), anxiety test score ( $x_2$ ) and age ( $x_3$ ) were given below :

$$r_{12} = +0.46, r_{13} = +0.35, r_{23} = +0.17.$$

Compute  $r_{12.3}$  and find whether it is significant or not. (Critical  $t_{0.01} = 2.576$ ). 4

- (d) Explain the binomial distribution. State the expression of binomial distribution.

2+2=4

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

(a) (i) A sample of 400 items is taken from a normal population whose mean is 4 and whose variance is also 4. If the sample mean is 4.45, can the sample be regarded as truly random sample?

(ii) Put up reasons to justify that the following statement **cannot** be true :

(A)  $b_{yx} = 0.8$  and  $b_{xy} = -0.3$

(B)  $b_{yx} = 0.8$  and  $b_{xy} = 2.4$  5+3=8

(b) (i) Find the correlation coefficient between earthworm density ( $X$ ) and soil pH ( $Y$ ) using the following results obtained from 15 experiments.

$$\sum X = 106.4, \sum X^2 = 755.95, \sum XY = 2058.4$$

$$\sum Y = 290, \sum Y^2 = 5696$$

Test whether the above correlation coefficient is significant at 5% level.

Given  $t_{0.05 (13)} = 2.16$

$$t_{0.05 (14)} = 2.145$$

$$t_{0.05 (12)} = 2.179$$

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(ii) Explain clearly the following terms in connection with testing of hypothesis

(a) Region of acceptance

(b) Error of inference  $5+1\frac{1}{2}+1\frac{1}{2}=8$

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