2008

M.Sc.

1st Semester Examination

ZOOLOGY

PAPER—Z-102

Full Marks : 40

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

Group—A

(Ecology)

1. Answer any *two* of the following :   2×2

   (a) What is reciprocal predatory cycle ?

   (b) What is General Diversity Index $(\overline{H})$?

   (c) What do you mean by keystone species ?

   (d) What is life table ?

2. Differentiate between (any *two*) : 4×2

    (a) Connectedness food web and energy food web.

    (b) Organismic and Individualistic concept.

    (c) Ecotone and Edge.

    (d) Source population and sink population.

3. Answer any *one* of the following :

    (a) Discuss Levin's model of metapopulation dynamics.

        Deduce the equation $P = 1 - \dfrac{e}{m}$, where 'e' is the probability of extinction of a local population, 'm' is the probability of colonization and P is the equilibrium. 5+3

    (b) What is competitive exclusion principle ? State one experimental and one natural evidence. 2+6

Group—B

(Biostatistics)

1. Write briefly about any *two* of the following : 2×2

    (a) Sampling errors.

    (b) Continuous probability distributions.

    (c) SE of estimate.

    (d) Reasons for preferring anova to *t* test.

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

  (a) Discuss the properties of simple linear regression.

  (b) Describe the assumptions of anova.

  (c) Give an account of the properties of binomial probability distributions.

  (d) Find whether or not there is a significant multiple linear correlation between Cardiac output (X_1) and the combination of venous return (X_2) and peripheral resistance (X_3), using the following product-moment r values between the respective variables in a sample of 53 chimpanzees. $(\alpha = 0.05)$

   $r_{12} = +\ 0.75$; $r_{13} = +\ 0.75$; $r_{23} = -\ 0.20$.

   Critical t scores : $t_{0.05(50)} = 2.009$;

               $t_{0.05(51)} = 2.008$; $t_{0.05(52)} = 2.007$.

3. Answer *either (a)* or *(b)* of the following questions :

  (a) (i) What is one-way anova? What determines the number and sizes of groups in an experiment to be subjected to a one-way anova?

     (ii) Work out one-way anova to find whether or not there is a significant difference between the mean tracheal ventilations (ml/min) of the following sample of locusts, respectively before and after their exposure to a pesticide. $(\alpha = 0.05)$

Animal No.	Tracheal Ventilations	
	Before (X_1)	After (X_2)
1	70	60
2	90	75
3	75	60
4	80	70
5	60	45
6	55	45
7	80	75
8	75	55
9	70	65
10	65	50

Critical F scores : $F_{0.05 (1, 19)} = 4.38$;

$$F_{0.05 (1, 18)} = 4.41 ; \quad F_{0.05 (2, 18)} = 3.55.$$

Or

(b) (i) Describe the assumptions of product-moment r.

(ii) Find whether or not there is a significant product-moment r between gill weights (X mg) and body-weights (Y gram) of the following sample of fishes, using the critical t scores quoted below. ($\alpha = 0.05$)

Animal No.	Gill weights (X)	Body weights (Y)
1	75	4.0
2	80	5.5
3	100	5.0
4	75	4.5
5	60	4.0
6	80	4.5
7	60	4.0
8	70	4.5
9	100	6.0
10	70	4.0

Critical t scores : $t_{0.05(9)} = 2.262$;

$$t_{0.05(8)} = 2.306 ; \quad t_{0.05(18)} = 2.101. \qquad 3+5$$