LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FIRST SEMESTER – **APRIL 2013**

ST 1502/ST 1500 - STATISTICAL METHODS

Date: 09/05/2013   Dept. No. ⬜   Max. : 100 Marks
Time: 1:00 - 4:00

PART – A

Answer ALL the questions   (10 x 2 = 20)

1. Mention the methods for collecting primary data.
2. What is nominal scale of measurement?
3. What are ogives?
4. A company is considering selecting one of the two mutually exclusive projects, A and B.
   The relevant information required to evaluate the riskiness of the project is given below:

Data pertaining to Net Present Value	Project A	Project B
Expected value	`36,000	`50,000
Standard deviation	27,000	32,000

   Which project would be less risky?
5. What is meant by 'curve fitting'?
6. Give the normal equations for fitting a second degree parabola.
7. Define correlation coefficient.
8. When do the regression lines coincide and when are they at right angles?
9. Define independence of attributes in a 2x2 table.
10. Write down Yule's coefficient of association.

PART – B

Answer any FIVE questions   (5 x 8 = 40 marks)

11. Explain the general rules of tabulation of data.
12. The medal count in London olympics 2012 for six countries is given below:

Country	Gold	Silver	Bronze
USA	46	29	29
China	38	27	23
Great Britain	29	17	19
Russia	24	26	32
Korea	13	8	7
Germany	11	19	14

Draw a suitable diagram and comment.

13. Find the interquartile range for the set of observations 16,5,7,13,2,9,3,20,13,6,5.
14. Define raw and central moments of a frequency distribution and bring out the relationship between them.
15. Explain the principles of least squares for fitting a straight line to an observed set of data.
16. From n pairs of values $(x_i, y_i), i = 1,2, \dots, n$, the following quantities are calculated

$$n = 20, \sum x_i = 400, \sum y_i = 220, \sum x_i^2 = 8800, \sum x_i y_i = 4300, \sum y_i^2 = 2620$$

Find the linear regression equations of x on y and y on x. Hence show that the correlation coefficient is the geometric mean of the regression coefficients.
17. What is a contingency table? Express the first order class frequencies in terms of second order class frequencies in a 2 x 2 table and explain the test for consistency.
18. The following table gives the distribution of students according to age in completed years and regular players among them:

Age in years	15	16	17	18	19	20
No.of students	250	200	150	120	100	80
Regular players	200	150	90	48	30	12

Calculate coefficient of association between maturity and playing habits on the assumption that maturity is attained in the 18th year of age.

PART – C

Answer any TWO questions   (2 x 20 = 40 marks)

19. (a) The number of moths collected in a light trap on five successive nights were
      210, 40, 376, 12, 50. Compare the arithmetic and geometric means.   (8 marks)
   (b) The frequency distribution of the height of plants recorded to the nearest millimetre is given below:

Height(in mms)	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
frequency	4	5	23	58	61	30	3	3

   Draw a histogram and locate the mode. Verify using the formula for mode.(12 marks)
20. (a) Describe the general rules for framing a questionnaire.   (10 marks)
   (b)When a machine in a factory is inoperative because of breakdowns or other difficulties during working hours, the condition is called "downtime." An efficiency expert measures durations of downtimes in minutes. Following is the frequency distribution of 200 downtimes which occurred in a factory during a week.
        Time (minutes)   : 10-19 20-29 30-39 40-49 50-59 60-69
        Number of downtimes :   15   62   67   42   10   4
   Calculate Karl Pearson measure of skewness   (10 marks)

21. The yield y(kilograms per plot) of a corn crop in a controlled experiment is measured and is thought to be related to the amount of irrigation supplied,x(hours per day) by the model $y = ax^b$.The following results have been obtained.

x	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
y	0.10	0.27	0.48	0.91	1.24	1.67	2.26	2.78	3.43	4.21	5.00	5.8

Plot these on a graph of y against x and comment on the shape of this graph.

Estimate the constants by the method of least squares.   (20 marks)

22. (a) It is believed that a patient who absorbs a drug well on one occasion will do so on another occasion. Twelve patients gave the following results for percentage absorbed on two days:

Patient	1	2	3	4	5	6	7	8	9	10	11	12
Day 1	35.5	16.6	13.6	42.5	39.0	29.5	28.5	36.0	19.7	42.0	30.3	24.5
Day 2	27.6	15.1	12.9	30.5	23.1	14.5	35.5	27.5	16.1	18.9	32.5	24.5

Calculate rank correlation coefficient and use it to decide whether the belief appears justified.   (12 marks)

(b) What is meant by 'association of attributes'? Discuss the various types of association.   (8 marks)

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