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Total Pages - 04 (Four)

15/PG/IS/COM-102

2015

M. Com.

1st Semester Examination

BASIC STATISTICS

PAPER – COM – 102

Full Marks : 50

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.

UNIT – I

1. Answer any two questions of the following: 5 X 2

- (a) Prove that Correlation Coefficient is independent of the change of origin and scale.
- (b) A Statistical problem is given to three friends A, B & C for solving separately. If the probability of solving the problem by A, B & C are 0.7, 0.8 & 0.6 respectively, then what is the probability that the problem will be solved?
- (c) When two events are said to be independent statistically? Prove that if two events are independent their complementary events will also be independent.
- (d) You are given that the two regression equations are $8x - 10y + 66 = 0$ and $40x - 18y = 214$; and standard deviation of x is 3. Find out (i) Average value of x & y , (ii) The correlation coefficient between the two variables and (iii) Standard deviation of y .

- b) i) Discuss how independence between the attributes can be judged?
ii) When is an index number formula said to satisfy Circular Test?
iii) In the following series of index numbers, shift the base from 1990 to 1993

| | | | | | | | |
|-----------|------|------|------|------|------|------|------|
| Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
| Index no. | 100 | 105 | 110 | 125 | 135 | 180 | 205 |

(Internal Assessment :10 marks)

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2. Answer any one questions of the following: 10 X 1

- a) i) If we have 'n' events $A_1, A_2, A_3, \dots, A_n$, then as per Boole's Inequality Theorem- prove that

$$P(\cup_{i=1}^n A_i) \leq \sum_{i=1}^n P(A_i)$$

- ii) If four squares are chosen on a chess board, then what is the probability that they will be on a diagonal line? 6+4
- b) i) A manufacturing firm has three plants, which produce the same product. The first, second & third plants produce 30%, 25% & 45% of the total production respectively. The firm has a single warehouse to store the finished products of all three plants without any distinction. From the past performance records on the proportion of defectives, it has been found that 10%, 15% & 20% of the items produced at first, second & third plants respectively are defectives. Before the shipment of the items to a buyer, one unit is selected at random and found defective. What is the probability that the item was produced in third plant?
- ii) The following correlation coefficients are given for a tri-variate distribution concerning the variables yield of paddy (x_1), rainfall (x_2) and fertilizer applied (x_3): $r_{12}=0.8$, $r_{13}=0.65$ and $r_{23}=0.7$

You are asked to calculate :

- I) Partial correlation coefficient between x_1 and x_3 , eliminating the effect of x_2 ; and
- II) Multiple correlation coefficient treating the first variable as dependent and the other as independent variables. 5+5

(Turn Over)

(3)

UNIT – II

3. Answer any two questions of the following: 5 X 2

- a) Examine whether Fisher's ideal index formula satisfy the Time reversal and Factor reversal tests.
- b) The following data relates to average number of tourists who use to come to Digha indifferent years. Fit an exponential trend by the Method of Least Squares.

| Year | 2010 | 2011 | 2012 | 2013 | 2014 |
|-----------------|--------|--------|--------|--------|--------|
| No. of tourists | 125083 | 128578 | 134157 | 135267 | 138776 |

- c) What is cost of living index number? What is its usefulness? 2+3
- d) i) What do you mean by consistency of data in calculating association between attributes?
ii) Is the data given consistent?
 $N=1000$, $(A)=500$, $(B)=550$, $(C)=450$, $(AB)=200$, $(BC)=250$, $(AC)=150$ & $(ABC)=120$. 2+3

4. Answer any one questions of the following: 10 X 1

- a) i) Owing to change in price the consumer price index of working class in a certain area rose in a month by one quarter of what it was before to 225. The index of food became 250 from 200 that of clothing from 185 to 205, that of fuel and lighting from 175 to 195 and that of miscellaneous from 138 to 212. The index of rent, however remained at 150. It was known that the weight of clothing, rent and fuel & light were the same. Find out the exact weight of all the groups.
- ii) Discuss the various steps in the construction of index number.

7+3

(Turn Over)