M.Com 1st Semester Examination, 2011

BASIC STATISTICS

PAPER—COM-102

Full Marks : 50

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

Notions have their usual meaning

UNIT – I

[*Marks* : 20]

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

(*a*) Give a brief note on 'Relative Frequency' approach of probability.

(*b*) A box contains 6 white, 7 red and 5 black balls. A person draws 4 balls from the box at random. What is the probability that among the balls drawn :

(*i*) There is at least one ball of each colour ?

(*ii*) All the balls are of the same colour ?

(*c*) For regression equation of y on x, show that

$$\sigma_e = \sigma_y \sqrt{1-r^2}.$$

(*d*) 'If two variables are independent their correlation coefficient is zero.' Is the converse true ? Explain with a suitable example.

2. Answer any *one* question from the following : 10×1

(*a*) (*i*) State and prove Bayes' theorem of inverse probability.

(*ii*) The Department of Commerce has arranged a picnic to be held on a particular day. The weather forecast says that there is 80% chance of fog on that day. If it is foggy the probability of a good picnic is 0·3 and if it is sunny the probability of a good picnic is 0·9. At the day end the picnic was good. Find the probability that the day was a sunny day. $5 + 5$

(*b*) (*i*) "A correlation coefficient of 0·7 does not mean that 70% of the data are explained." Comment.

(*ii*) In a study of a random sample of 100 students, the following results are obtained :

$\overline{X}_1 = 60$, $\overline{X}_2 = 65$, $\overline{X}_3 = 68$

$S_1^2 = 81$, $S_2^2 = 36$, $S_3^2 = 25$

$r_{12} = 0{\cdot}50$, $r_{13} = 0{\cdot}55$, $r_{23} = 0{\cdot}65$

where X_1, X_2 and X_3 denote percentage of marks obtained by a student in Part-I, Part-II and Part-III examinations respectively.

Required :

(*A*) Obtain the least square regression equation of X_3 on X_1 and X_2 ;

(*B*) Compute $r_{3\cdot 12}$;

(*C*) Estimate the percentage of marks of a student in Part-III examination, if he gets 58% in Part-I and 64% in Part-II.

3 + (4 + 2 + 1)

UNIT – II

[*Marks* : 20]

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

(*a*) Identify the component's name in time series of the following and justify your answer with proper reasons : 1 × 5

(*i*) Sale of umbrella

(*ii*) Sale of computer

(*iii*) Sale of Motorcycle

(*iv*) Export of rice from India due to earthquake in another country.

(*v*) Sale of gold due of Dhanterus.

(*b*) (*i*) Shift the origin backward by 2 years of the following equation :

$$Y = 20(\cdot 4)^t$$ (origin : year 2005, t unit = 1 year)

(*ii*) Convert the following equation in monthly form :

$$Y = 20 + \cdot 5t$$ (origin : year 2008, t unit : 1 year, Y = Annual sales) 2 + 3

(*c*) In First Semester Examination of M.Com. at which 100 candidates appeared, boys exceed girls by 16% of all candidates. Number of passed candidates exceeded the number of failed candidates by 60. Boys failing in examination number 10.
Calculate the co-efficient of association between sex and success in the examination. 5

(*d*) Of 1000 people consulted, 811 liked chocolates, 752 liked coffees and 418 liked sweets, 570 liked chocolates and coffees ; 356 liked chocolates and sweets and 348 liked coffees and sweets ; 297 liked all three. Is this information correct ? Justify your answer through association of attribute concept. 5

4. Answer any *one* question from the following : 10 × 1

(*a*) Fit a straight line equation from the following :

Year	:	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production (Tons)	:	30	28	35	38	42	45

Also estimate the production for the year 2013-14. 7 + 3

(*b*) (*i*) Show that Fisher's price index formula satisfies Factor Reversal Test.

(*ii*) Calculate Fisher's ideal price index from the following:

Commodity	Base Year Quantity (kgs.)	Current Year Quantity (kgs.)	Base Year Price (£)	Current Year Price (£)
A	2000	1700	6	10
B	500	420	50	70
C	100	80	130	180
D	200	180	700	900

(*iii*) What is Chain base index and Cost of living index? 3 + 3 + (2 + 2)

[*Internal Assessment* : 10 Marks]