BUSINESS STATISTICS-II

Time : Three Hours Maximum Marks :

[Regular Candidates : 80, Reappear Candidates 90]

Note : Attempt ***five*** questions inall. Question No. 1 is compulsory.

1. (a) How partial correlation is similar to and different from multiple correlation?

   (b) List down the properties of regression coefficients.

   (c) What is coefficient of determinatiohn ? In an analysis involving two variables, the coefficient of determination is found to be 0.74. How will you inter-

pret this value ?

(d) State and develop the addition theorem of probability for mutually exclusive events.

(e) With the help of an example, explain the concept of conditional probability.

(f) What are Type I and Type II Errors in hypothesis testing ? 2+3+3+3+3+2

2. (a) Explain the meaning and significance of the concept of correlation. Does correlation always signify casual relationships between two variables ?

(b) List down important properties of Karl Pearon's coefficient of correlation.

(c) Draw a scatter diagram from the data givenbelow and interpret it.

X	10	20	30	40	50	60	70	80
Y	32	20	24	36	40	28	38	44

3. (a) Find out the two regression equations showing the regression of production on capacity utilization and the regression of capacity utilization on production from the following data :

	Mean	Standard Deviation
Production (in lakh units)	35.6	10.5
Capacity Utilization (in %age)	84.5	8.5

The coefficient of correlation between production and capacity utilization is found to be 0.62.

Estimate the production, when capacity utilization is 70%. Also estimate the capacity utilization, when production is 30 lakh units.

(b) The equations of two regression lines between two variables are expressed as :

$2X - 2Y = 0$ and $4Y - 5X - 8 = 0$

(i) Identify which of the two can be called regression line of Y on X and X on Y.

(ii) Find $\overline{X}$ and $\overline{Y}$ and correlation coefficient r from the equations. 8+8

4. (a) What do you understand by the term 'probability'. Explain the relative frequency approach to the definition of probability.

(b) The odds that A speaks the truth are 7:3 and the odds that B does so are 3:2. In what percentage of cases are they likely to agree each other on an identical point ?

(c) State and develop the Bays' Theorem of probability.

5. (a) How is the concept of probability is relevant to decision making under uncertainty ?

(b) The chances of solving a problem in mathematics by four students A, B, C and D are 1/5, 1/4, 1/3, and 1/2 respectively. Find the probability that the problem

(i) will be solved

(ii) Will not be solved

(c) What is the probability that a non leap year, selected at random, will contain

(i) 52 Sundays ?

(ii) 53 Sundays ?

(iii) 54 Sundays ? 5+6+5

6. (a) What is a time series ? What are different components of a time series ? Explain.

(b) What purpose does the time series analysis serve ? What are additive and multiplicative models of time series analysis ? 8+8

7. (a) At a university level 100 students are classified according to their IQ level and economic condition, as follows :

Economic Condition	IQ Level			Total
	High	Medium	Low	
Rich	160	300	140	600
Poor	140	100	160	400
Total	300	400	300	1000

Use χ^2-test to find out whether there is association between IQ level and economic condition ($\chi^2 = 5.99$ for 2 d.f. and at 5% level of significance).

(b) A company is engaged in the packacing of a superior quality tea in jars of 500 gm each. The company is of the view that as log as the jars contains 500 gm of tea, the process is under control. The standard deviation of the process is 50 gm. A sample of 255 jars is taken at random and the

sample average is found to be 510 gm. Has the process gone out of control ? 8+8

8. Explain the following :

(a) "Correlation and Regression are Two sides of the same coin."

(b) Spearman's Rank Correlation Coefficient.

(c) Standard Error of Estimate

(d) Parametric tests and Non-parametric tests.

(e) Null and Alternative hypotheses. 3+3+4+3+3