Total No. of Questions—**5**] [Total No. of Printed Pages—**8**

Seat No.	

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S.Y. B.Com. EXAMINATION, 2012

BUSINESS STATISTICS

Paper I

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 80**

N.B. **:—** (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) Use of calculator and statistical tables is allowed.

1. (A) Attempt any *four* of the following : [2 each]

(*a*) For the given data,

Mean = 58,

Mode = 64 and S.D. = 20,

find Karl Pearson's coefficient of skewness.

(*b*) If $\mu'_1 = 1$, $\mu'_2 = 4$, calculate variance.

(*c*) Define Autoregressive model.

P.T.O.

(*d*) State whether each of the following statements given below is True *or* False :

(*i*) The multiple correlation coefficient lies between –1 and 1.

(*ii*) For a symmetric distribution, mean, median and mode are equal.

(*e*) State *three* methods of collecting vital statistics.

(*f*) What do you mean by extrapolation ?

(B) Attempt any *two* of the following : [6 each]

(*a*) Calculate trend values of 5-yearly period of moving average from the following series :

Year	**Sales** (000)
1974	50.0
1975	36.5
1976	43.0
1977	44.5
1978	38.9
1979	38.1
1980	32.6
1981	38.7
1982	41.7
1983	41.7
1984	33.8

(*b*) Determine an initial basic feasible solution to the following transportation problem by using matrix-minima method (mmm). Also find corresponding cost of transportation.

From \ To	Warehouses			Capacity
	A	B	C	
I	1	2	3	50
II	3	2	1	80
III	4	5	6	75
IV	3	1	2	95
Requirement	120	80	100	300

(*c*) The first four raw moments of a frequency distribution are 1.5, 17, –30, 308 respectively. Comment on the nature of Skewness and Kurtosis.

2. Attempt any *two* of the following : [8 each]

(*a*) If $C(x) = 5x^4 + 3x^2 - 20$ is the manufacturer's total cost equation, find :

(*i*) the average cost

(*ii*) the average variable cost

(*iii*) the average fixed cost

(*iv*) the marginal average cost.

(*b*) (*i*) The following is the information on employment and education :

Employed graduates = 286,

Unemployed graduates = 48,

Employed undergraduates = 450

Unemployed undergradates = 216.

Compute coefficient association between employment and education. Comment on the result.

(*ii*) Obtain dual of the following linear programming problem :

Maximize :

$$z = 10x_1 + 8x_2$$

Subject to :

$$4x_1 + x_2 < 90$$

$$x_1 + 3x_2 < 80$$

$$x_2 < 20$$

$$x_1, x_2 > 0$$

(*c*) Given :

$$\bar{x}_1 = 28.02, \quad \bar{x}_2 = 4.91, \quad \bar{x}_3 = 5.94$$

$$\sigma_1 = 4.42, \quad \sigma_2 = 1.10, \quad \sigma_3 = 8.5$$

$$r_{12} = 0.3, \quad r_{13} = 0.4, \quad r_{23} = 0.56$$

Obtain the equation of least square plane of x_1 on x_2 and x_3. Also estimate x_1 when $x_2 = 6.5$ and $x_3 = 0.232$.

3. Attempt any *two* of the following : [8 each]

(*a*) Using simplex method, solve the following L.P.P. :

Maximize :

$$z = 4x_1 + 10x_2$$

Subject to :

$$2x_1 + x_2 < 50$$

$$2x_1 + 5x_2 < 100$$

$$2x_1 + 3x_2 < 90$$

$$x_1 > 0 \quad x_2 > 0.$$

(*b*) Using Lagrange's Interpolation formula find the value of Y when X = 9.5.

X	**Y**
7	3
8	1
9	1
10	9

(*c*) Find initial basic feasible solution of the following transportation problem using VAM :

To → **From ↓**	**I**	**II**	**III**	**IV**	**Availability**
A	3	6	8	5	450
B	6	1	2	5	500
C	7	8	3	9	350
Requirement	250	350	400	300	1300

Also find the corresponding transportation cost.

4. Attempt any *two* of the following : [8 each]

(*a*) From the following information calculate G.F.R. and T.F.R.

Female Age Group	**No. of Female ('000)**	**No. of Births**
15–19	16.0	260
20–24	16.4	2244
25–29	15.8	1894
30–34	15.2	1320
35–39	14.8	916
40–44	15.0	280
45–49	14.5	145

(*b*) The population of a town in the different year was as given below. Using Newton's method, estimate the population for the year 1947 :

Year	**Population**
1941	28.0
1951	29.4
1961	30.5
1971	35.5

(*c*) (*i*) Explain additive model and multiplicative model in time series.

(*ii*) Define the terms :

(I) Positive class

(II) Ultimate class

(III) Profit function

(IV) Break-even point.

5. Attempt any *two* of the following : [6 each]

(*a*) Estimate trend by fitting straight line equation to the following time series :

Year	**Sales** ('000)
1992	20
1993	22
1994	23
1995	20
1996	18

Also obtain the trend value of sales for the year 2000.

(*b*) A company has to assign five workers to five jobs. The cost matrix is given below :

Jobs / Workers	I	II	III	IV	V
A	7	6	9	12	17
B	2	14	17	2	11
C	17	12	9	9	9
D	10	15	13	11	17
E	11	14	12	9	17

Find an optimal assignment for minimization.

(*c*) Obtain CDR and STDR for city A and city B. Take city B as standard population :

Age Group	City A		City B	
	Population	Death	Population	Death
Below 10	600	18	400	16
10–20	1000	15	1500	6
20–60	3000	24	2400	24
60 and above	400	20	700	21