2017

DDE

M.Com. Part–I Examination

QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS

PAPER—II

Full Marks : 100

Time : 4 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.

Illustrate the answers wherever necessary.

Write the answer question of each Half in <u>separate books</u>.

First Half

(*Business Statistics*)

[Marks : 50]

Answer *Q. No. 1* and any *two* from the rest.

1. Answer any *four* questions of the following :   4×5

   (a) From the following illustrations identify the names of the components in Time Series analysis and justify your answer with proper reasons.

(i) Increase in Sale of Gold on Dhanterous;

(ii) Increase in Sale of Mobile Phone;

(iii) Icrease in import of foodgrains in India due to severe flood.

(b) Show that

$$\frac{L(P)}{L(Q)} = \frac{P(P)}{P(Q)} = V_{on}, \text{ where}$$

L(P) is Laspeyres's Price Index.

L(Q) is Laspeyres's Quantity Index.

P(P) is Paschee's Price Index;

P(Q) is Paschee's Quantity Index and V_{on} is Value Index.

(c) Calculate Yule's Co-efficient of Association between marriage and failure of Students from the following data pertaining to 500 students :

	Passed	Failed	Total
Married	90	65	155
Un-married	260	110	370

(d) Use proportion method to determine the nature of association between A and B :

	B	β	Total
A	30	50	80
α	20	100	120
Total	50	150	200

(e) Establish the relationship between 'Δ' (Delta) operator and 'E' (Epsilon) operator in Interpolation.

(f) Suppose a student has found, for a given set of values of x_1, x_2 and x_3,

$$r_{12} = .91, \quad r_{13} = .33 \text{ and } r_{23} = .81$$

Examine whether the computed values are consistent.

(g) Prove that the correlation co-efficient does not depend on the origin and scale of measurement of the observations.

(h) Write a note on 'Control Chart' used in statistically quality control.

2. (a) Given that $Y = 120 + 1.5t + .8t^2$ (where Y = Annual Sales of Sugar, origin : year 2010, t unit = 1 year)

Shift the origin of the equation t_0

(b) Find the quarterly trend values from the following data by the Moving Average Method, using an appropriate period :

Quarterly output (million tons)

Quarter/years	2014	2015	2016
I	52	59	57
II	54	63	61
III	67	75	72
IV	55	65	60

(c) Calculate the seasonal Index from the following data using the Average Method :

Year/Quarter	1st	2nd	3rd	4th
2012	72	68	80	70
2013	76	70	82	74
2014	74	66	84	80
2015	76	74	84	78
2016	78	74	86	82

2+7+6

3. (a) Show that Fisher's Price Index formula satisfies both the Time Reversal and Factor Reversal Tests.

(b) Construct the index numbers of price from the following data by applying :

(i) Laspeyres's method ;

(ii) Paschee's method ;

(iii) Edgeworth-Marshal method.

Commodity	2012		2016	
	Price (Rs.)	Quantity	Price (Rs.)	Quantity
A	2	8	4	6
B	5	10	6	5
C	4	14	5	10
D	2	19	2	13

(c) Given an Index number Series (Base 2012)

Year	Index Number
2010	95
2011	98

2012	100
2013	105
2014	112
2015	120
2016	125

Shift the base of the above series to year 2014.

6+6+3

4. (a) Derive the Newton's Backward Interpolation formula and also state when it is applicable.

(b) Using Newton's interpolation formula, find the number of factories earning less than Rs. 65,000 as profits from the following data : 8+7

Profits (Rs. 1000) :	30–40	40–50	50–60	60–70	70–80
No. of factories :	34	43	56	39	29

5. (a) The regression equations of the variables x and y are $8x - 10y + 66 = 0$ and $40x - 18y = 214$. The variance of x is 9. Identify the two refression lines. Find the coefficient of correlation between the two variables and also the variance of y.

(b) In a contest, two judges ranked eight students A, B, C, D, E, F, G and H in order of their preference as shown in the following table. Find the rank correlation coefficient and interpret the result your arrive at :

Candidates :	A	B	C	D	E	F	G	H
First Judge :	5	2	8	1	4	6	3	7
2nd Judge :	4	5	7	3	2	8	1	6

9+6

Second Half

(Quantitative Techniques for Managerial Decisions)

[Marks : 50]

Answer Q. No. 6 and any two from the rest.

6. Answer any four of the following : 4×5

(a) Solve the following assignment problem of minimizing the total time for doing all the jobs : 5

Operators/Jobs → ↓	1	2	3	4	5
A	6	2	5	3	6
B	2	5	8	7	7
C	7	8	6	9	8
D	6	2	3	4	5
E	9	3	8	9	7
F	4	7	4	6	8

(b) Write short notes on :

(i) unbalanced Transportation problem ;

(ii) Degeneracy in Transportation problem. 2½+2½

(c) Find the solution of the following linear programming problem using graphical method.

Minimize $z = 4x_1 + 3x_2$

Subject to,

$$200x_1 + 100x_2 \geq 4000$$

$$x_1 + 2x_2 \geq 50$$

$$40x_1 + 40x_2 \geq 1400$$

and $x_1 \geq 0, x_2 \geq 0.$ 5

(d) What do you mean by —

(i) Slack Variable ;

(ii) Artificial Variable and

(iii) Unbounded Solution of L.P.P. ?   1+2+2

(e) Explain the term 'Dummy Activity' in network analysis. Distinguish between 'Merged Event' and 'Burst Event'. How will you deal with the situation if negative value of independent float or interfering float is obtained ?   2+2+1

(f) Write short notes on the following :

(i) Time Cost Trade off ;

(ii) Dangling.   2½×2

(g) State the assumptions of M/M/1 Queueing Model.   5

(h) What are the components of 'Ordering Cost' and 'Carrying Cost' in relation to inventory problem ? How do they behave ?   3+2

7. A Cement factory manager is considering the best way to transport cement from his three manufacturing centres P, Q, R to depots A, B, C, D and E. The weekly production and demands alongwith transportation cost per tonne are given below :

		Depot					Supply (Tonnes)
		A	B	C	D	E	
Manufactuing	P	4	1	3	4	4	60
Centre	Q	2	3	2	2	3	35
	R	3	5	2	4	4	40
Demand (Tonnes)		22	45	20	18	30	135

Using Vogel's approximation method (VAM), find the optional distribution programme.   15

8. Solve the following Linear Programming Problem using Simplex method.

$$\text{Min } z = 4x_1 + 2x_2$$

Subject to, $3x_1 + x_2 \geq 27$;

$-x_1 - x_2 \geq 21$;

$x_1 + 2x_2 \geq 30$

Provided that $x_1, x_2 \geq 0$ 15

9. The following information is given :

Activity	Pessimistic Time (in weeks)	Most Likely Time (in weeks)	Optimistic Time (in weeks)
1–2	3	3	3
2–3	9	6	3
2–4	6	4	2
3–5	8	6	4
4–6	8	6	4
5–6	0	0	0
5–7	5	4	3
6–7	8	5	2

Required :

Draw the Network diagram for the above.

Calculate :

(i) Variance to each activity.

(ii) Critical path and expected project length.

(iii) The probability that the project will be completed in 23 weeks.

Given that :

Z value :	1.90	1.91	1.92	1.93	1.94
Probability	0.9713	0.9719	0.9726	0.9732	0.9738

     5+5+5

10. Explain and derive Economic order quantity (EOQ) model with uniform rate of demand. State its assumptions.

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