2012

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 separate books.

First Half

(*Business Statistics*)

[Marks : 50]

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

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

(a) Write down the properties of Linear Regression. 5

(b) (i) Write the prove the relationship between the operators Δ and E.

(ii) Distinguish between Chance Cause and Assignable Cause in the context of SQC.

$2\frac{1}{2} \times 2$

(c) The male population of a certain state in India is 331 lakhs. The number of literate males is 66 lakhs and the number of male criminals is 33 lakhs. If the number of literate male criminals is 6 lakhs, calculate the Yule's co-efficient of association between literacy and criminality in the state. 5

(d) If L(p) and P(q) represent Laspeyres index number of prices and Paasche index number for quantity, show that $L(p) \times P(q) = V_{01}$

where V_{01} is the value index number.

Hence or otherwise show that $\frac{L(p)}{L(q)} = \frac{P(p)}{P(q)}$. 5

(e) Show that the residual variance

$Var(c) = var(y)\ (1 - r^2)$ 5

(f) Write a brief note on 'Cost of Living Index'. 5

(g) Identify the components name in Time Series Analysis with proper reasons :

(i) Rise in sales of Mobile Phone.

(ii) Increase in sales of Gold due to Dhantaras.

(iii) High withdrawal of money from the bank in the first week of every month.

(iv) Increase in import of foodgrains due to destruction of crop in flood.

(v) Rise in use of L.P.G. by the households.

(h) Given below are two series of index numbers, one with 1991 as base and other with 2001 as base :

Year	Index (1991 Base)	Index (2001 Base)
1991	100	—
1995	120	—
1998	122	—
2000	125	—
2001	130	100
2003	—	110
2005	—	112
2008	—	115
2010	—	120

Splice the two incomplete series to get a continuous series.

2. (a) Fit a linear trend equation from the following information and also calculate the estimated production for the year 2014–15 :

Year	Production ('000 tons)
2004–05	50
2005–06	48
2006–07	40
2007–08	52
2008–09	60

(b) Suppose the seasonal index of different months are :

January — 110 ;	February — 98 ;
March — 102 ;	April — 105 ;
May — 120 ;	June — 130 ;
July — 110 ;	August — 115 ;
September — 118 ;	October — 95 ;
November — 90	December — 90

If the linear trend equation is $y = 60 + 2t$ (origin = 1st January 2010 ; t units = 1 month), calculate the estimated sales for the month of August, 2013.

(7+2)+6.

3. (a) From the following data calculate quantity index number by using appropriate method :

Commodity	*Quantity* (in Qts)		*Value* (in Rs. '000)
	1991	2009	2009
A	54	250	540
B	93	75	825
C	18	56	448
D	6	8	56
E	23	47	141

(b) Determine the weight for the food group, if cost of living index for the year 2005 is found to be 175 with 2000 as base year :

Group	*% increase in expenditure*	*Weight*
Food	65	—
Clothing	90	12
Fuel	20	18
Misc.	70	10
Rent	150	20

8+7

4. (a) Derive Newton's Backward Interpolation formula and state the criteria for its application.

(b) Using suitable interpolation formula, calculate the value of y when x = 25 :

x :	7	11	15	19	23	27
y :	20256	20625	21296	22407	24098	26511

(6+2)+7

5. (a) Assuming no tie in ranks, deduce Spearman's formula for rank correlation. Show that Spearman r_k lie between – 1 and + 1.

(b) Distinguish between partial and multiple correlation.

(c) Obtain the value of y when x = 60 from the following :

$\bar{x} = 50$, $\bar{y} = 80$, $\sigma_x = 10$, $\sigma_y = 15$, $r_{xy} = -0.4$. 8+3+4

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 : 5×4

(a) How would you deal with the assignment problems, where (i) the objective function is to be maximised ? (ii) some assignments are prohibited ?

(b) Give a brief description of an LPP with illustration. How can it be solved graphically ?

(c) What are the various assumptions of EOQ formula ?

(d) In a railway marshalling yard, goods trains arrive at a rate of 36 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service distribution is also exponential with an average of 30 minutes. Calculate :

(i) Average waiting time in queue,

(ii) Probability of idleness of the service counter,

(iii) Average number of trains in the system,

(iv) Average number of trains in the queue.

(e) What is a Float in network analysis? What are the different types of Floats? How could you compute them ?

(f) Demonstrate 'uv' method as it is used in the optimality test of a transportation problem.

(g) Describe the features of a Travelling Salesman problem. What are the common assumptions in such type of problems?

(h) How would you resolve a tie situation while selecting the departing variable in linear programming problem?

7. (a) A manufacturer has distribution centres at X, Y, and Z. These centres have available 40, 20, and 40 units of his product. His retail outlets at A, B, C, D, and E require 25, 10, 20, 30, and 15 units respectively. The transport cost (in rupees) per unit between each centre and each outlet is given in the following table. Determine the cheapest distribution schedule :

Distribution Centres ↓	Retail Outlets				
	A	B	C	D	E
X	55	30	50	50	40
Y	35	30	100	45	60
Z	50	60	95	35	30

(b) Would you like to revise the optimum distribution schedule for the above problem, if there is an overall and uniform increase in the unit transportation cost by Rs. 10? What would then be the total transportation cost? 12+(2+1)

(Continued)

8. A Company makes two kinds of leather belts. Belt A is a high quality and Belt B is of lower quality. The respective profits are Rs. 4 and Rs. 3 per belt. Each of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient of only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 per days are available. There are only 700 buckles a day available for Belt B. What should be the daily production of each type of belt ? Formulate the LPP and solve it by Simplex method. 3+12

9. (a) The following table gives data on normal time and cost and crash time and cost for a project :

You are required to:

(i) draw the network, identify the critical path, and determine the normal project completion time and cost ;

(ii) crash the activities systematically and determine the optimum project completion time and cost ; and,

(iii) also determine the minimum possible project completion time ignoring cost increase :

Activity	Normal Time (days)	Normal Cost (Rs.)	Crash Time (days)	Crash Cost (Rs.)
1 — 2	8	100	6	210
1 — 3	4	150	2	350
2 — 4	2	50	1	90
2 — 5	10	100	6	400
3 — 4	5	100	1	200
4 — 5	3	80	1	100

Consider indirect cost Rs. 70 per day.

(b) Write a note on 'Time Estimation' of the activities of a project. (2+8+2)+3

(Turn Over)

10. (a) M/s. Motor Bearings Ltd. Is committed to supply 72,000 bearings per annum to M/s. Speed Ltd. on a steady daily basis. It is estimated that it costs 15 paise as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is Rs. 162.

(i) What should be the optimum run size for bearing manufacture ?

(ii) What would be the interval between two consecutive optimum runs ?

(iii) Find out the minimum inventory cost.

(b) Explain with suitable example the 'Ordering Cost' and 'Carrying Cost' in relation to Inventory problem.

(c) What are the characteristics of an Input Process in Queuing Theory?

6+4+5

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