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2015

MBA 1st Semester Examination

QUANTITATIVE METHODS

PAPER—103

Full Marks : 100

Time : 3 Hours

The figures in the 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 answers to Questions of each Half in separate books.

(First Half)

[Marks : 50]

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

(a) Explain different forms of kurtosis with the help of diagram.

(b) The regression equation calculated from given set of observations are $x = -.4y + 64$ & $y = -.6x + 46$. Compute correlation coefficient.

(c) Distinguish between primary data & secondary data with examples.

(d) State different types of correlation with the help of scatter diagram.

(e) Prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

(f) What is the probability that a leap year will contain 53 sundays ?

2. Answer any *two* questions from the following : 10×2

(a) Find the mean and variance of the binomial distribution.

(b) Calculate the mean deviation about mean for the following distribution :

Marks :	0-10	10-20	20-30	30-40	40-50
No. of students	6	9	10	14	11

(c) Compute Fisher's ideal index from the following data :

Commodities	Base year		Current year	
	Price	Quantity	Price	Quantity
A	4	3	6	2
B	5	4	6	4
C	7	2	9	2
D	2	3	1	5

[Internal Assessment : 10]

(Second Half)

[Marks : 50]

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

(a) How would you modify the assignment technique to solve a problem in the following situations ?

(i) An individual is incapable of performing a particular task ;

(ii) An individual is to be assigned with two tasks.

(b) Prove that the evaluations of empty cells (for Optimality Test) under Stepping Stone Method and 'Modi Method'

or 'uv Method' are the same in magnitude but opposite in sign. Assume a 4×4 matrix with imaginary figures.

3+2

(c) What are the different types of inventory costs ? Indicate the behaviours of the major ones.

(d) Write the dual of the following LPP :

Minimise $Z = 6x_1 + 4x_2 + 6x_3 + x_4$

Subject to : $4x_1 + 4x_2 + 4x_3 + 8x_4 \leq 21$

$3x_1 + 17x_2 + 80x_3 + 2x_4 = 48$

Where x_1 and $x_2 \geq 10$, x_3 and x_4 are unrestricted.

(e) The mean arrival rate of patients in a hospital is 5 patients per hour against a mean service rate of 6 patients per hour. Find the following :

(i) The average number of patients in the system,

(ii) The average number of patients waiting to receive treatment,

(iii) The average time a patient spends in the system,

(iv) The probability that a patient arriving at the hospital will have to wait.

(f) Wha is 'Shadow Price' ? Explain it in respect of a LPP.

		Products			
		X	Y	Z	
Resources	A	1	2	1	≤ 11
	B	1	1	1	≤ 9
	C	2	1	1	≤ 12
Profit		3	2	4	

Find an optimum production programme using simplex method. 10

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

(ii) Find the optimal order quantity (q) of a product for which the price breaks are as follows :

q	Price / Unit (Rs.)
$0 < q \leq 100$	50
$100 < q \leq 300$	48
$300 < q$	46

The monthly demand for the product is 500 units. The storage cost is 20% of the unit cost of the product and the ordering cost is Rs. 25 per order. 4+6

[Internal Assessment : 10]

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4. Answer any *two* of the following questions : 2×10

(a) A company solicits bids on each of four projects from five contractors. Only one project may be assigned to any contractor. The bids received (in thousands of rupees) are given in the accompanying table. Contractor D feets unable to carry out project 3 and therefore, submits no bid.

Project	Contractor				
	A	B	C	D	E
1	18	25	22	26	25
2	26	29	26	27	24
3	28	31	30	–	31
4	26	28	27	26	29

(i) Use the Hungarian method to find the set of assignments with the samllest possible total cost.

(ii) What is the minimum total achievable cost ?

8+2

(b) Three products are produced using three resources. The quantity of resources available, the unit consumption of these resources for production of different products, and the profit per unit sale of the products are indicated by the table below.