2012

MBA

1st Semester Examination

QUANTITATIVE METHODS

PAPER—MBA-103

Full Marks : 100

Time : 3 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 answers to Questions of each Half in separate books.

(First Half)

(Marks : 50)

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

(a) Prove that standard deviation is independent of any change of origin, but is independent on the change of scale.

(b) Establish the relationship between correlation coefficient and two regression co-efficients.

(c) With the help of the data given below calculate the price index numbers by (a) Paasche's method and (b) Laspeyres' method :

Commodity	2001		2011	
	Price (Rs.)	Quantity (Kgs.)	Price (Rs.)	Quantity (Kgs.)
A	20	8	40	6
B	50	10	60	5
C	40	15	50	10
D	20	20	20	15

(d) 'Index numbers are economic barometers' — Explain this statement and mention the limitations of index numbers (if any).

(e) State the components of Time Series.

(f) What do you understand by the terms — skewness and Kurtosis ?

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

(a) In the frequency distribution of 100 families given below, the number of families corresponding to expenditure groups 20—40 and 60—80 are missing from the table. However, the median is known to be 50. Find the missing frequencies :

Expenditure :	0–20	20–40	40–60	60–80	80–100
No. of families :	14	?	27	?	15

(b) The following table relates to the tourists arrivals (in millions) during 1994 to 2000 in India :

Year :	1994	1995	1996	1997	1998	1999	2000
Tourist arrivals :	18	20	23	25	24	28	30

Fit a straight line trend by the method of least squares and estimate the number of tourists that would arrive in the year 2004.

(c) (i) Find the mean and variance of the Poisson distribution.

(ii) When three unbiased coins are tossed, what is the probability of obtaining two heads ? 7+3

[***Internal Assessment : 10 Marks***]

(Second Half)

(Marks : 50)

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

(a) Explain with the help of an example, the optimality criterion of an assignment problem having alternative optimum solutions.

(b) A person repairing radios finds that the time spent on the radio set has exponential distribution with mean 20 minutes. If the radios are repaired in the

order in which they come in and their arrival is approximately Poission with an average rate of 15 for 8-hour day, what is the repairman's expected idle time each day? What is the average numner of jobs in the system? 3+2

(c) What is an 'Artificial Variable' in Linear Programming Problem? Why and when is it introduced in Simplex method of LPP solution?

(d) In a warehouse the annual demand for an item is 12,500 units. The ordering cost is Rs. 10 per order. The inventory carrying cost is 20% per annum. There are three price breaks. Orders in the range of 1,000 — 4,999 units cost Re. 0.48 per unit. Orders in the range of 5,000 — 9,999 units have a price of 0·42 per unit and orders of 10,000 or more units are priced at Rs. 0·36 per unit. What quantity should be ordered to minimise total annual cost?

(e) Perform optimally test under 'uv' method on the following solution of a transportation problem (Notations and figures have their usual meaning) :

	P	Q	R	S	T	
A	6 / 5		6	7 / 8	4	13
B	8	7	5 / 5	6	6 / 7	11
C	5	8 / 7	6	6 / 4	8	14
D	6	5 / 6	4	7	6 / 5	11
	6	13	5	13	12	

(f) What is 'Shadow Price'? Explain it in respect of a LPP. What economic principle governs the shadow price? 4+1

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

(a) A marketing manager has five salesmen and sales districts. Considering the capabilities of the salesmen and the nature of districts, the marketing manager estimates that sales per month (in thousand rupees) for each salesman in each district would be as follows :

		Districts				
		A	B	C	D	E
Salesman	1	32	38	40	28	40
	2	40	24	28	21	36
	3	41	27	33	30	37
	4	22	38	41	36	36
	5	29	33	40	35	30

Find the assignment of salesmen to districts that will result in maximum sales.

(b) A small manufacturer employs 5 skilled men and 10 semi-skilled men and makes an article in two qualities — a Deluxe model and an Ordinary model. The making of a Deluxe model requires 2 hours work by a skilled man and 2 hours work by a semi-skilled man. The ordinary model requires 1 hour work by a skilled man and 3 hours work by a semi-skilled man. The manufacturer's profit of the Deluxe model is Rs. 10 and of the Ordinary model is Rs. 8. Use Simplex method to solve the problem to maximise profit.

(c) (i) Explain the inventory model with uniform rate of demand and finite rate of replenishment. 5

(ii) Explain different types of customer-bnehaviour in Queuing. What statistical assumptions are necessary in dealing with queueing problems? 3+2

[*Internal Assessment : 10 Marks*]