MBA/IS/103/09

2009

MASTER OF BUSINESS ADMINISTRATION

[1st Semester]

(Quantitative Methods)

PAPER—103

Full Marks : 100

Time : 3 hours

The figures in the right-hand margin indicate 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 : 5×4

(*a*) Construct a pie-chart for the following data :

Principal Exporting Countries of Cotton (1,000 bales)— 1955 - 56

USA	India	Egypt	Brazil	Argentina
6,367	2,999	1,688	650	202

(*b*) The arithmetic mean of two observations is 25 and their geometric mean is 15. Find (*i*) their harmonic mean and (*ii*) the two observations.

(*c*) The following table gives the marks in Management obtained by boys and girls studying in a college. Find the standard deviation of the marks in Management of boys and girls taken together.

	Boys	Girls
Number	400	100
Average marks	68	65
Variance of marks	9	4

(*d*) State the basic properties of simple correlation coefficient.

(*e*) Fit a straight line to the following data by the method of least squares :

x :	15	20	25	30	35
y :	12	14	18	25	31

(*f*) Two cards are drawn from a full pack of 52 cards. Find the probability that (*i*) one is a heart and the other is a diamond, (*ii*) both are red cards.

2. Answer any *two* questions : 10 x 2

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

(*ii*) Prove that the correlation coefficient does not depend on the origin or scale of the observations. 5 + 5

(*b*) (*i*) Show that neither Laspeyve's formula nor Paasche's formula obeys time reversal or factor reversal test.

(*ii*) Find the median and the median class of the data given below :

Class boundaries :	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75
frequency :	4	11	19	14	6	2

5 + 5

(*c*) (*i*) State with reason whether the following statements are '*True*' or '*False*' :

(*I*) The two regression lines always intersect at point $(\bar{x}, \bar{y})$.

(*II*) If the correlation coefficient between x and y is equal to zero, the two regression lines coincide.

(*III*) If one regression coefficient is negative, the other would be positive.

(*ii*) Regression of savings (s) of a family on income (y) may be expressed as $s = a + \frac{y}{m}$, where a and m are constants. In a random sample of 100 families the variance of savings is one-quarter of the variance of incomes and the correlation is found to be 0·4. Obtain the estimate of m. 6 + 4

[*Internal Assessment* — 10 Marks]

SECOND HALF

[*Marks* : 50]

3. Answer any *four* of the following questions : 5 x 4

(*a*) Describe the computational procedure used in testing the optimality of a transportation problem.

(*b*) How would you resolve a tie situation while selecting the departing variable in lpp ?

(*c*) What information can be derived from the final simplex table ?

(*d*) Explain EOQ model with different rates of demand. What are the limitations of an EOQ model ?

(*e*) What do you mean by a 'non-empty queue' ? How does it differ from an 'empty queue' ? How is 'queue length' measured in a non-empty queue ?

(*f*) Would you change an optimal transportation schedule if you find that the transportation costs in every case have undergone a change by a constant amount ? Explain with an illustration.

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

(*a*) There are four jobs : A, B, C, D. These jobs are to be performed in four machine centres : I, II, III, IV. One job is to be allocated to a machine centre, though each machine is capable of doing any of the jobs, however, at different costs as shown in the matrix below :

Jobs	Machine Centres			
	I	II	III	IV
A	21	30	40	50
B	15	14	12	16
C	23	22	24	25
D	30	34	32	33

(*i*) Find an allocation of jobs to the machine centres so that the total cost of processing is minimum.

(*ii*) If machine centre IV goes out of order, which jobs will then be allocated to the rest of the centres at minimum cost? 5 + 5

(*b*) A stereo equipment manufacturer can produce two models *A* and *B* of 40 and 80 watts total music power each. Each model passes through three manufacturing divisions— 1, 2, and 3 where model *A* takes 4, 2 · 5 and 4 · 5 hours each and model *B* takes 2, 1, and 1 · 5 hours each. The three divisions have a maximum of 1600, 1200 and 1600 hours respectively available every month. Model *A* gives a contribution of Rs. 400 each and *B* gives Rs. 100 each. Assuming abundant product demand, find out the optimum product mix and the maximum contribution available, using simplex method. 10

(*c*) Determine the economic purchase quantity for the following situation :

Annual demand is 10,000 units,
Ordering cost is Rs. 28·80, and
Carrying cost per unit per year is 20% of the unit price

The quantity versus unit price schedule is :

0—9999	Rs. 2·00
10000—19999	Rs. 1·60
20000—and above	Rs. 1·40

Also compute the total cost at the EOQ determined by you. How frequently should the orders be made? 7 + 2 + 1

[*Internal Assessment* — 10 Marks]