2013

M B A

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) Distinguish between primary data and secondary data with examples.

   (b) The numbers 3·2, 5·8, 7·9 and 4·5 have frequencies x, (x+2), (x–3) and (x+6) respectively. If the arithmetic mean is 4·876, find the value of x.

(c) A student obtained the mean and s.d. of 100 observations as 40 and 5·1 respectively. It was later found that he had wrongly copied an observation as 50, the correct figure being 40. Calculate the correct S.D.

(d) Distinguish between seasonal fluctuation and cyclical fluctuation. Find the trend of the following series using three-year moving average : 2+3

Year :	1	2	3	4	5	6	7
Values :	2	4	5	7	8	10	13

(e) If r = 8, $\Sigma xy = 60$, $\sigma y = 2\cdot 5$ and $\Sigma x^2 = 90$, find the number of items (x and y are deviations from the arithmetic means).

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

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

(a) For a bivariate data the mean value of X is 20 and the mean value of Y us 45. The regression co-efficient of Y on X is 4 and that of X on Y is 1/9. Find :

(i) The co-efficient of correlation ;

(ii) The standard deviation of X if the standard deviation of Y is 12. Also write down the equations of regression lines. [3+(3+4)]

(b) For a set of 10 observations, the AM and C.V, are 40 and 40% respectively. If one observation equal to 50 is left out, what will be the value of AM & C.V. from the remaining 9 observations in the set ? 5+5

(c) (i) State and prove total theorem of probability for two mutually exclusive events.

(ii) 5 persons A, B, C, D and E speak at a meeting. What is the probability that A speaks immediately before B ?

(iii) Two cards are drawn from full pack of 52 cards. Find the probability that 'one is Heart and other is Diamond'.   3+3+4

[*Internal Assessment : 10 Marks*]

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(*Second Half*)

(Marks : 50)

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

(a) What is loop in a transportation problem ? Explain with example the characteristic features of loops.

(b) Convert the following LP problem into its Dual :

Max $Z = 6x_1 + 5x_2 + 10x_3$

Subject to : $4x_1 + 5x_2 + 7x_3 \leq 5$

$3x_1 + 7x_3 \leq 10$

$2x_1 + x_2 + 8x_3 = 20$

$2x_2 + 9x_3 \geq 5$

Where $X_j \geq 0$, $j = 1, 2$, x_2 is unrestricted.

(c) Can there be multiple optimal solutions to an assignment problem? How would you identify the existence of multiple solutions. if any?   1+4

(d) What do you mean by 'Single Channel' and 'Multi-Channel' queue? What is Traffic Intensity? If traffic intensity is 0.30, what is the percentage of time a system remains idle?   2+1+2

(e) A retail store sells 5,200 units of a product in a year. Each unit costs Rs. 2 to the store. The wholesaler charges Rs. 10. Charges on the working capital are 15 per cent and the insurance charges on inventory amount to 5 per cent per annum. All other expenses are either fixed in nature or do not vary with the level of inventory or the quantity ordered. The owner is presently following the policy of ordering 100 units every week. He wishes to evaluate his inventory policy. What recommendations would you make?

(f) Use the graphical method to solve the following LP problem :

Maximise $Z = 15x_1 + 10x_2$

Subject to : $4x_1 + 6x_2 \le 360$

$$3x_1 \le 180, \ 5x_2 \le 200$$

Where $x_1, x_2 \ge 0$.

(Continued)

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

    (a) ABC Tool Company has a sales force of 25 men, who operate from three regional offices. The company produces four basic product lines of hand tools. Mr. Jain, the sales manager, feels that 6 salesmen are needed to distribute product line I, 10 to distribute product line II, 4 for product line III and 5 salesmen to product line IV. The cost (in Rs.) per day of assigning salesman from each of the offices for selling each of the product lines are as follows :

Regional	Product Lines			
Office	I	II	III	IV
A	18	16	21	20
B	16	14	28	17
C	20	19	23	29

At present, 10 salesmen are allocated to office A, 9 to office B and 7 salesmen to office C. How many salesmen should be assigned from each office to sell each product line in order to minimise costs? Identify alternate optimum solutions, if any. 7+3

    (b) A farmer has 1,000 acres of land on which he can grow corn, wheat or soyabean. Each acre of corn costs Rs. 100 for preparation, requires 7 man-days of work and yields a profit ofRs. 30. An acre of wheat costs Rs. 120 to prepare, requires 10 man-days of work and yields a profit of Rs. 40. An acre of soyabean costs Rs. 70 to prepare, requires 8 man-days of work and yields a profit of Rs. 20. If the farmer has Rs. 1,00,000 for preparation and can count on 8,000 man-days of work, determine using simplex method, how many acres should be allocated to each crop in order to maximise profits ?

                (Turn Over)

(c) (i) How could you resolve a situation when one or more of the coefficients in the objective function of an LP problem is / are changed after optimum solution is reached ?

(ii) A television repairman finds that the time spent on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs the sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution with an approximate average rate of 10 per 8-hour day, what is the repairman's expected idle time each day ? What is the expected average number of TV sets in the system ?   4+(3+3)

[Internal Assessment : 10 Marks]