MANAGEMENT PROGRAMME

Term-End Examination

December, 2013

MS-51 : OPERATIONS RESEARCH

Time : 3 hours   Maximum Marks : 100

(Weightage 70%)

Note : Attempt *any four* questions. All questions carry *equal* marks.

1. (a)   Define Operations Research. Describe the main characteristics of Operations Research. Discuss the significance and scope of Operations Research in modern management.

    (b)   A firm has an advertising budget of Rs. 7,20,000. It wishes to allocate this budget to two media: magazines and television, so that total exposure is maximized. Each page of magazine is estimated to result in 60,000 exposures, whereas each spot on television is estimated to result in 1,20,000 exposures. Each page of magazine advertising costs Rs. 9,000 and each spot on television costs Rs. 12,000. An additional condition that the firm has specified is that atleast two pages of magazine advertising and atleast 3 spots on television be used. Determine the optimal media-mix for this firm-through SIMPLEX method.

2. (a)   Explain in brief Gomory's method for solving an integer linear programming problem.

(b) A company manufacturing air-coolers has two plants located at Mumbai and Kolkata with a weekly capacity of 200 units and 100 units, respectively. The company supplies air coolers to its 04 show rooms situated at Ranchi, Delhi, Lucknow and Kanpur which have a demand of 75, 100, 100 and 30 units respectively. The cost of transportation per unit in Rs. is shown in the following table :

	Ranchi	Delhi	Lucknow	Kanpur
Mumbai	90	90	100	100
Kolkata	50	70	130	85

Plan the production programme so as to minimize the total cost of transportation. Use vogel's Approximation Method (VAM).

3. (a) Discuss the ABC analysis and its importance in inventory management of a manufacturing company.

(b) A company manufactures around 200 cycles. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 cycles to 204 cycles, whose probability distribution is as given below :

Production/day :	196	197	198	199	200	201	202	203	204
Probability :	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished cycles are transported in a specially designed two storeyed lorry that can accommodate only 200 cycles. Using the following 15 random numbers 82, 89, 78, 24, 52, 53, 61, 18, 45, 04, 23, 50, 77, 27, 54, 10, simulate the process to find out :

(i)   the number of cycles waiting in the company

(ii) the number of empty space on the lorry

4. (a) Discuss the applications of dynamic programming in decision making. How is this different from linear programming ?

(b) "Small variations in optimal order size will not change the total cost of inventory appreciably". Do you agree with this statement ? Give justification in support of your answer.

5. (a) Discuss various steps of Goal Programming (GP) formulation. How does GP help in decision making ?

(b) Telephone users arrive at a booth following a Poisson distribution with an average time of 5 minutes between one arrrival and the next. The time taken for a telephone call is on an average 3 minutes and it follows an exponential distribution : What is the probability that the booth is busy ? How many more booths should be established to reduce the waiting time to less than or equal to half of the present waiting time ?

6. Write short notes on **any four** of the following :
    (a) Saddle point in Game Theory
    (b) Travelling salesman problem
    (c) Branch and Bound algorithm
    (d) Assignment Problem
    (e) Non-linear programming
    (f) Sensitivity Analysis in LP-problem

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