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MS-51

01451

MANAGEMENT PROGRAMME

Term-End Examination

December, 2014

MS-51 : OPERATIONS RESEARCH

Time : 3 hours *Maximum Marks : **100***

(Weightage 70%)

Note : *(i) Attempt **any four** questions.*

*(ii) All questions carry **equal** marks.*

1. (a) What is the concept of Operations Research ? "Operations Research (OR) is useful only if applied with Information Technology". Comment.

(b) Two products X and Y, both require processing time on machines I and II. Machine-I has 200 hours available, and Machine-II has 400 hours available. Product X requires one hour on machine-I and four hours on machine-II. Product Y requires one hour on machine-I and one hour on machine-II. Each unit of product X yields ₹ 500 profit and each unit of Y yields ₹ 250. Formulate the problem as LPP.

2. (a) What do you understand by simulation ? Why is simulation used ? Give practical application of simulation technique.

(b) A toy manufacturer uses 48,000 rubber wheels per year for its popular dump truck series. The firm makes its own wheels, which it can produce at a rate of 800 per day. The toy trucks are assembled uniformly over the entire year. Carry cost is ₹ 10 per wheel a year. Set-up cost for a production run of wheels is ₹ 450. The firm operates 240 days per year.

Determine each of the following :

(a) Optimal run size

(b) Cycle time for the optimal run size

3. (a) Discuss the applications of dynamic programming in decision making. How is it different from Linear Programming ?

(b) Consider a manufacturer who operates three factories and dispatches his products to five different retail shops. The table-1 indicates the capacities of the three factories, the quantity of products required at the various retail shops and the cost of shipping one unit of product from each of three factories to each of five retail shops.

Table 1 : Transportation Problem

Factory	Retail Shop					Capacity
	1	2	3	4	5	
1	1	9	13	36	51	50
2	24	12	16	20	1	100
3	14	33	1	23	26	150
Requirement	100	70	50	40	40	

Find an initial basic feasible solution of the transportation problem.

4. (a) Consider the game :

		B 1	B 2	B 3
A	1	5	50	50
	2	1	1	0.1
	3	10	1	10

Verify that the strategies

$(\frac{1}{6}, 0, \frac{5}{6})$ for player A and

$(\frac{49}{54}, \frac{5}{54}, 0)$ for player B are optimal and also find the value of the game.

(b) Four persons A, B, C, D are assigned to work on four different machines. The following table shows how long it takes for a specific person to finish a job at a specific machine.

Persons	Machines			
	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	14	10

Find the optimal allocation i.e. how the machines should be assigned to A, B, C, D so that the job is completed in minimum time.

5. (a) What is buffer stock ? List the reasons for keeping a buffer stock. Suppose the lead time for procurement of a product gets doubled, will you recommend doubling its buffer stock ? Justify your answer.

(b) An airline is planning to open a satellite ticket desk in a new shopping plaza, staffed by one ticket agent. It is estimated that requests for tickets and information will average 15 per hour, and requests will follow a Poisson distribution. Service time is assumed to be exponentially distributed. Previous experience with similar satellite operations suggests that mean service time should average about three minutes per request.

Determine each of the following :

(i) System Utilization

(ii) The expected number of customers waiting to be served.

6. Write short notes on **any four** of the following :

(a) Travelling Salesman Problem

(b) Gomory's Cutting Plane Algorithm

(c) Bellman's Principle of Optimality

(d) Unbalanced Assignment Problem

(e) VED Classification

(f) Decoupling