No. of Printed Pages : 4 **MS-51**

01771

MANAGEMENT PROGRAMME

Term-End Examination

June, 2015

MS-51 : OPERATIONS RESEARCH

Time : 3 hours *Maximum Marks : 100*

(Weightage : 70%)

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

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

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1. (a) "Executive at all levels in business and industry come across the problems of making decisions at every stage in their day-to-day activities. Operations research provides them with various quantitative techniques for decision - making and enhance their ability to make long range plans and solve everyday problems of running a business and industry with greater efficiency, competence, and confidence" - Elaborate the statement with suitable examples.

(b) What do you understand by simulation ? How is a simulation technique better than mathematical models in solving problems of business and industry ? Discuss taking suitable examples.

2. (a) Four factories (A, B, C, D) supply the requirements of three warehouses (E, F, G). The availability at the factories, the requirements of the warehouses and the various associated unit transportation cost are presented in the following table.

Find the initial basic feasible solution of the transportation problem by using Vogel Approximation Method.

Factory	Warehouses			Available
	E	F	G	
A	10	8	9	15
B	5	2	3	20
C	6	7	4	30
D	7	6	8	35
Requirement	25	26	49	100

(b) The Delta Corporation is both a producer and a user of brass couplings. The firm operates 220 days a year and uses the couplings at a steady rate of 50 per day. Couplings can be produced at a rate of 200 per day. Annual storage cost is ₹ 10 per coupling, and machine set up cost is ₹ 350 per run.

(i) Determine the economic run size.

(ii) Approximately how many runs per year will there be ?

(iii) Compute the maximum inventory level.

3. (a) Consider the problem of assigning five operators to five machines. The assignment costs are given below.

		Operators				
		I	II	III	IV	V
Machines	A	20	22	35	22	18
	B	4	26	24	24	7
	C	23	14	17	19	19
	D	17	15	16	18	15
	E	16	19	21	19	25

Assign the operators to different machines so that total cost is minimised.

(b) Auto vehicles arrive at a petrol pump, having one petrol filling unit, in a Poisson distribution manner with an average of 10 units per hour. The service time is distributed exponentially with a mean of three minutes.

Determine **any five** of the following :

(i) The average number of units in the system.

(ii) The average waiting time for the customers.

(iii) The average length of the queue.

(iv) The probability that a customer arriving at the station will have to wait.

(v) The utilization factor for the petrol pump.

(vi) The probability that the number of customers in the system is two.

4. (a) "Goal programming appears to be the most appropriate, flexible and powerful technique for complex decision problems involving multiple conflicting objectives". Discuss.

(b) Discuss the application of dynamic programming in decision making. How is this different from linear programming ?

5. (a) An appliance manufacturer produces two models of microwave ovens, H and W. Both models require fabrication and assembly work; each H uses four hours of fabrication and two hours of assembly and each W uses two hours of fabrication and six hours of assembly. There are 600 fabrication hours available this week and 480 hours of assembly. Each H contributes ₹ 400 to profits and each W contributes ₹ 300 to profits. What mix of H and W will maximize profits ? Solve graphically.

(b) Find the optimum strategies for A and B and the value of the game.

	B		
A	1	3	11
	8	5	2

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

(a) ABC Analysis
(b) Saddle point in Game theory
(c) Branch and bound algorithm
(d) Sensitivity Analysis in L.P.P.
(e) GOMORY's cutting plane algorithm
(f) FIFO and LIFO