

00461

MANAGEMENT PROGRAMME

Term-End Examination

June, 2014

MS-51 : OPERATIONS RESEARCH

Time : 3 hours

Maximum Marks : 100

(Weightage 70%)

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- Note :** (i) *Attempt any four questions.*
(ii) *All questions carry equal marks.*
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1. (a) "Operation Research is an aid for the executive in making his/her decisions by providing him/her with needed quantitative information based on the scientific method of analysis" - Discuss the statement and give examples to demonstrate how Operation Research is helpful in decision making.
- (b) A small construction firm specializes in building and selling single family homes. The firm offers two basic types of houses, model A and model B. Model A houses require 4000 labour hours, 2 tons of stone, and 2000 board feet of lumber. Model B houses require 10,000 labour hours, 3 tons of stone, and 2000 board feet of lumber. Due to long lead times, for ordering suppliers and the scarcity of skilled and semiskilled workers in the area, the firm will be forced to rely on its present resources for the upcoming building season. It has 4,00,000

hours of labour, 150 tons of stone, and 2,00,000 board feet of lumber. Profit for model A is rupees 1 lakh per unit and model B's yield is rupees 2 lakh per unit. Set up the relevant LPP in equalities.

2. (a) 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.
 - (b) A local distributor for a national tyre company expects to sell approximately 9600 steel - belted radial tyres of a certain size and tread design next year. Annual carrying costs are Rs. 16 per tyre, and ordering costs are Rs. 75. The distributor operates 288 days a year.
 - (i) What is the EOQ ?
 - (ii) How many times per year does the store reorder ?
 - (iii) What is the length of an order cycle ?
3. (a) Discuss various steps in Goal Programming model formulation. How does GP help in decision making ?
 - (b) Four factories (A, B, C, D) supply the requirements of three warehouses (E, F, G). The availability at the factories, the requirement of the warehouses and the various associated unit transportation costs are presented in the following table :

Table : Transportation Problem

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
Required	25	26	49	100

Find an initial basic feasible solution of the transportation problem.

4. (a) State Bellman's Principle of optimality and explain by an illustrative example how it can be used to solve multistage decision problems.
- (b) A company has 5 jobs to be done on five machines. Any job can be done on any machine. The cost of doing the jobs in different machines are given below. Assign the jobs for different machines so as to minimise the total cost.

Jobs	Machines				
	A	B	C	D	E
1	13	8	16	18	19
2	9	15	24	9	12
3	12	9	4	4	4
4	6	12	10	8	13
5	15	17	18	12	20

5. (a) Explain Saddle Point, pure and mixed strategy and theory of dominance in game theory.
- (b) Customers arrive at an average rate of 18 per hour on week day morning. The arrival distribution can be described by a Poisson distribution with a mean of 18. The clerk can serve a customer in an average of four minutes; this time can be described by an exponential distribution with a mean of 4.0 minutes.
- (i) What are the arrival and service rates ?
- (ii) Compute the utilization rate of the service station.
- (iii) Suppose it has been determined that the average number of customers waiting in line is 3.6. Compute the average number in the system (i.e. waiting in line or being served), the average time customers wait in line, and the average time in the system.
6. Write short notes on **any four** of the following :
- (a) Branch and bound algorithm
- (b) Degeneracy in L.P. problem
- (c) Sensitivity Analysis in L.P.P.
- (d) ABC Analysis
- (e) Periodic Review System
- (f) FIFO and LIFO.
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