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FACULTY OF MANAGEMENT M.B.A. II – Semester Examination, July 2014

Course No. – 2.5 **Operations Research**

Time: 3 Hours

Max. Marks: 80

Note : Answer All questions $PART - A (10 \times 2 = 20 Marks)$

- Write short notes on the following: 1
 - (a) Nature of Operations Research
 - (c) Limitations of OR
 - (e) Sensitivity analysis
 - (g) Distinguish between PERT and CPM
 - (i) Queuing Theory objectives

- (b) Dynamic programming
- (d) Degeneracy in TP
- Assignment problem (f)
- (h) Time-Cost-Trade off
- Simulation (i)

$PART - B (5 \times 12 = 60 Marks)$ Answer all the questions using the internal choice.

2 (a) Explain the mathematical and economic structure of the Linear programming problems.

OR

- (b) A furniture manufacturing company plans to make two products i.e., chairs and tables from its available resources, which consists of 400 board feet of mahogany and 450 man-hours of labour. It knows that making a chair requires 5 board feet and 10 man-hours and yields of profit of Rs.45, while each table uses 20 based feet and 15 man-hours and has a profit of Rs.80. Formulate LP model to maximise the profit.
- Ranker (a) Solve graphically the following LPP: 3 Maximize, $Z = 8x_1 + 16x_2$ Subject to: $x_1 + x_2 \leq 200$ $x_2 \ \leq 12$ $\begin{array}{l} 3x_1 \, + \, 6x_2 \leq 900 \\ x_1, \, x_2 \geq 0 \end{array}$
 - (b) Write the dual of the following LPP : Minimsie $Z = 10x_1 + 20x_2$ Subject to : $3x_1 + 2x_2 \ge 18$ $x_1 + 3x_2 \ge 8$ $2x_1 - x_2 \le 6$ $x_1 - x_2 \ge 0$
- (a) Solve the following transportation problem and obtain the initial solution by NW Carmer 4 rule

OR

То	1	2	3	4	Supply
From					-
А	7	3	8	6	60
В	4	2	5	10	100
С	2	6	5	1	40
Demand	20	50	50	80	200

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OR

(b) Using the following cost matrix, determine optimal Job assignment and the cost assignment.

Job	1	2	3	4	5
Machine					
А	10	3	3	2	8
В	9	7	8	2	7
С	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

(a) Draw a network diagram and show the critical path along with EST and LFT. 5

Activity	Time (weeks)	Activity	Time (weeks)
1-2	4	3-5	3
1-3	7	4-5	1
1-4	9	4-7	9
2-5	6	5-7	8
2-6	10	6-7	4
	-		

OR

(b) The following tables gives the activities in a construction project and other relevant information.

Activity	Immediate	Time(Days)		Direct cost (Rs)		
	predecessor	Normal	C Crash	Normal	Crash	
А	-	4	3	60	90	
В	-	6	4	150	250	
С	-	2	1	38	60	
D	A	5	3	150	250	
E	С	2	2 ·	100	100	
F	A	7	5	115	175	
G	D,B,E	4	2	100	240	
t costs va	t costs vary as follows:					

Indirect costs vary as follows:

			- X \							
Days	15	14	.13	12	11	10	9	8	7	6
costs (Rs)	600	500	400	250	175	100	75	50	35	25

Determine the project duration which will return in minimum total project cost.

(a) The Taj service station has a central store where service mechanics arrive to take space 6 parts. The machines wait in queue if necessary and are served on FIFO basis. The store is mained by one attendent who can attend 8 machines in an hour on an average. The arrival rate of the mechanics averages 6 per hour. Determine Ls, Lq, Ws and Wq where the symbols carry their usual meaning as per queuing model.

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0	R	

(b) The following is the pay-off matrix of a game being played by A and B. Determine the optimal strategies for the players and the value of the game.

	B's stra	ategy
A's Strategy	b1	b2
a1	8	-7
a2	-6	4