Code: 13A03701

R13

B.Tech IV Year I Semester (R13) Supplementary Examinations June 2017

OPERATIONS RESEARCH

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) How do you classify OR models?
(b) What is degeneracy in LP problem?
(c) What do you mean by economic interpretation of duality?
(d) List the optimality methods in transportation problem.
(e) Explain minimax criterion.
(f) What is 'Balking' in queuing?
(g) What are the assumptions in n-job – 2 machine sequencing?
(h) What is crashing in CPM?
(i) Define dynamic programming.
(j) What are the types of replacement problem?

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Use the graphical method to solve the following LP problem.
Minimize $Z = -x_1 + 2x_2$
Subject to constraints $-x_1 + 3x_2 \leq 10$
$x_1 + x_2 \leq 6$
$x_1 - x_2 \leq 2$
and $x_1, x_2 \geq 0$

OR

3 Solve the following LP problem using the Simplex method.
Max $Z = 5x_1 + 3x_2$
Subject to constraints $x_1 + x_2 \leq 2$
$5x_1 + 2x_2 \leq 10$
$3x_1 + 8x_2 \leq 12$
and $x_1, x_2 \geq 0$

UNIT - II

4 Write the dual to the following LP problem.
Max $Z_x = 2x_1 + 5x_2 + 6x_3$
Subject to $5x_1 + 6x_2 - x_3 \leq 3$; $-2x_1 + x_2 + 4x_3 \leq 4$; $x_1 - 5x_2 + 3x_3 < 1$; $-3x_1 - 3x_2 + 7x_3 \leq 6$ and $x_1, x_2, x_3 \geq 0$

OR

5 For the following transportation problem. Find the initial basic feasible solution by VAM.

	D_1	D_2	D_3	D_4	Supply
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

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UNIT - III

6 Obtain the optimal strategies for both persons and the value of the game, for two person zero sum game whose payoff matrix is as follows.

Player B

Player A		B_1	B_2	B_3	B_4	B_5	B_6	B_7
	A_1	-1	3	-1	4	2	2	-5
	A_2	-3	5	6	1	2	2	0

OR

7 A TV repairman finds that the time spent on his jobs has an exponential distribution with a mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per 8 hour day. What is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?

UNIT - IV

8 We have 5 jobs, each of which must be processed on the two machines A and B in the order AB. Processing time in hours are given as follows:

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

Determine a sequence for the 5 jobs that will minimize the elapsed time T.

OR

9 For a project of 12 activities, the details are given below. Draw the network and find earliest and latest occurrence times, critical activities and project completion time:

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Dependence	-	-	-	B,C	A	C	E	E	D,F,H	E	I,J	G
Duration (Days)	9	4	7	8	7	5	10	8	6	9	10	2

UNIT - V

10 Use dynamic programming to solve the following LP problem:

Maximize $Z = 3x_1 + 4x_2$

Subject to $2x_1 + x_2 \leq 40$

$2x_1 + 5x_2 \leq 180$

and $x_1, x_2 \geq 0$

OR

11 Machine 'A' cost Rs. 45,000 and the operating costs are estimated at Rs. 1000 for the first year, increasing by Rs. 10,000 per year in the second and subsequent years. Determine the optimum period for replacement of the machine.

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