FINAL EXAMINATION – JULY 2017
MASTER OF SCIENCE (M.Sc. MATHEMATICS)
Final Year – Fourth Semester
Operations Research

| 4M.Sc. 4 |

Time : 3 Hours   **Max Marks : 70**
                                                               Min. Marks : 25

Note :-   **Solve any two parts from each question. All questions carry Equal marks.**

Q.1.   (a)   Explain necessity of operation research in industry.
       (b)   Use simplex method to solve following L.P.P.
             Maximize $Z = 4x_1 + 10x_2$ subject to constraints $2x_1 + x_2 \leq 50, 2x_1 + 5x_2 \leq 100, 2x_1 + 3x_2 \leq 90, x_1 \geq 0$ and $x_2 \geq 0$.
       (c)   Explain duality in linear programming problem.

Q.2.   (a)   Explain dual simplex method to solve linear programming problem.
       (b)   Use dual simplex method to solve following L.P.P.
             Minimize $Z = 3x_1 + x_2$ subject to
                 $x_1 + x_2 \geq 1, 2x_1 + 3x_2 \geq 2, x_1, x_2 \geq 0$.
       (c)   Explain linear goal programming problem.

Q.3.   (a)   Use Vogel's approximation method to obtain initial basic feasible solution to the following transportation problem:
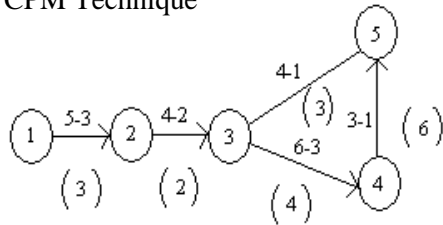
	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

       (b)   Find the optimum solution of following transportation problem:

	D_1	D_2	D_3	D_4	Supply
s_1	3	7	6	4	5
s_2	2	4	3	2	2
s_3	4	3	8	5	3
Demand	3	3	2	2	

       (c)   Explain procedure of assignment problem.

Q.4. (a) Determine the least cost schedule for the following project using CPM Technique

Overhead cost per day is Rs. 6. The number above and below the activities have the usual meaning.

(b) The table below provides cost and gives estimates of seven activities of a project:

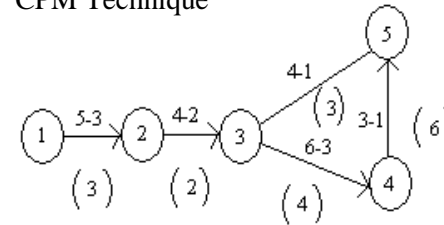| Activity (i-j)	Time Estimates (Weeks)		Direct cost estimates (Rs)	
	Normal	Crash	Normal	Crash
1-2	2	1	10	15
1-3	8	5	15	21
2-4	4	3	20	24
3-4	1	1	7	7
3-5	2	1	8	15
4-6	5	3	10	16
5-6	6	2	12	36

(i) Draw the project network corresponding to normal time.
(ii) Determine the critical path and the normal duration and normal cost of the project.

(c) Explain project planning.

Q.5. (a) Use dynamic programming to solve the following L.P.P.
Maximize $Z = 3x_1 + 5x_2$ subject to:
$x_1 \leq 4, x_2 \leq 6, 3x_1 + 2x_2 \leq 18$ and $x_1, x_2 \geq 0$.
(b) Explain the procedure of solving L.P.P by dynamic programming.
(c) What are the application of dynamic programming?

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