Course Code: 4MSCM4
Course: Operation research
Credit: 4
Last Submission Date: October 31, (for January session)
April 30 (for July Session)

Max. Marks:-70
Min. Marks:-25

Note:-Attempt all questions.

Que.1 Solve the following by simplex method

Maximum: $Z=2x_1 + 3x_2$

s.t.c. $x_1 + 5x_2 \leq 15$

$2x_1 + x_2 \leq 10$

& $x_1, x_2 \geq 0$

Que.2 Write the dual of the following L.P.P

Maximum $Z = x_1 + 2x_2 + x_3$

s.t.c. $2x_1 + x_2 - x_3 \leq 2$

$2x_1 - x_2 + 5x_3 \leq 6$

$4x_1 + x_2 + x_3 \leq 6$

& $x_1, x_2, x_3 \geq 0$

Que.3 Use dual simplex method to

Maximize $Z = -3x_1 - 2x_2$

Subject to $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$

& $x_1, x_2 \geq 0$

Que.4 A company manufactures two products , radios and transistors, which must be processed through assembly and finishing department . Assembly has go hours available, finishing can handle up to 72hours of work . Manufacturing one radio requires 6 hours in assembly and 3 hours in finishing . Each transistor requires 3 hours in assembly and 6 hours in finishing if profit is Rs. 120 per radio and Rs. 90 per transistor, determine the best combination of radios and transistors to realize profit of Rs. 2100.

Que.5 Find the optimum solution to the following transportation problem in which the cells contain the transportation cost in rupees.

	W1	W2	W3	W4	W5	Available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	100 (Total)

Que.6 Five wagons are available at stations 1,2,3,4 & , these are required at five stations

I, II , III IV, V . The mileages between various stations are given by the table below. How should be the wagons be transported so as to minimize the total mileage covered .

	I	II	III	IV	V
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

Que.7 A project consists of a series of tasks labelled A,B -------, H,I with the following relationships (W<X, Y means X and Y can not start until W is completed ; X,Y<W means W can not start until both X and Y are completed). With this notation construct the network diagram having the following constraints:

A<D, E; B,D<F; C<G; B<H; F,G< I.

Que.8 The time estimates (in weeks) for the activities of a PERT network are given below:

Activity	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

Draw the project network and identify all paths through it.

Que.9 Solve by dynamic programming:

Maximize $Z= 2x_1 + 5x_2$

Subject to $2x_1+ x_2 \leq 430$

$2x_2 \leq 460$

$X_1 , X_2 \geq 0$

Que.10 Use dynamic programming to show that $\sum_{i=1}^{n} p_i$ .log p_i subject to the constraint $\sum_{i=1}^{n} p_i =1$, $p_i \geq 0$ for all i is minimum when $p_1 =p_1$ -------$p_n = \frac{1}{n}$.