Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

I SEMESTER M.TECH (CONSTRUCTION ENGINEERING & MANAGEMENT)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: OPERATIONS RESEARCH AND DECISION THEORY

[CIE 5102]

REVISED CREDIT SYSTEM

Time: 3 Hours **(26/12/2016)** MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL FIVE full questions**.
- Missing data may be suitable assumed.

1A.	Under what situations, decision making becomes necessary?	**(01)**
1B.	Explain decision tree with a suitable example	**(03)**
1C.	A company wishes to buy new equipment X or Y, both satisfying all the requirements. The project requiring one of these two equipments is expected to last 2 or 3 years. The initial cost of X is ☐ 6, 00,000 and of Y is ☐ 4, 50,000. Operating cost/year of X is estimated at ☐30,000 or ☐40,000 or ☐50,000 while for Y it is estimated at ☐ 80,000 or ☐90,000. Which equipment would you select if you are the decision-maker in that company, based on (i) Laplace principle with expected values, (ii) Least regret principle (iii) Hurwicz criterion	**(06)**
2A.	Rewrite the following LPP in its standard form and indicate the IBFS. Minimize $Z = 4x_1 + 8x_2 + 12x_3$ Subject to $12x_1 + 16x_3 \leq 20$ $20x_1+4x_2+24x_3 = 28$ $32x_1 + 36x_3 \geq 8$ and $x_1, x_2, x_3 \geq 0$	**(02)**
2B.	Solve the following LPP using Big M method Minimize $Z= 10x_1+15x_2+20x_3$ Subject to $2x_1+4x_2+6x_3 \geq 24$ $3x_1+9x_2+6x_3 \geq 30$ And $x_1,x_2,x_3 \geq 0$	**(08)**

3A. Distinguish between PRIMAL & its DUAL **(02)**

3B. Find the IBFS using VAM and optimal solution by MODI (u-v) method. The **Profits** in the cells are in thousands of ☐ **(08)**

Destination

Plant	D_1	D_2	D_3	D_4	Supply
P_1	180	180	200	220	200
P_2	100	140	260	170	100
Demand	75	100	100	30	

4A. Write the canonical form of assignment model **(01)**

4B. The matrix below gives the processing time in days. How the five different Jobs should be assigned to five different Engineers such that the total processing time is minimized. **(09)**

Jobs \ Engineers	E1	E2	E3	E4	E5
J1	10	12	15	12	8
J2	7	16	14	14	11
J3	13	14	7	9	9
J4	12	10	11	13	10
J5	8	13	15	11	15

5A. Write a note on importance of random number generation in management problems **(02)**

5B. Use Dynamic Programming to solve the following LPP **(04)**

Maximize $Z=6x_1+10x_2$

Subject to $x_1 \leq 8$

$x_2 \leq 12$

$3x_1+2x_2 \leq 36$

And $x_1, x_2 \geq 0$

5C. A management consultant is an expert in his field. The number of clients approaching him appears to be Poisson distributed with a mean of 6 clients per hour. The consultant attends the clients on a first-come-first-served basis and the clients wait if the need be. The consultant is such an expert that, he can attend the clients at an average rate of 10 per hour with the service time exponentially distributed. Determine the, **(04)**

(i) probability of the number of arrivals (0 through 5) during a 15 minute interval
(ii) average length of the queue having at least one client
(iii)average waiting time in the queue