Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH. (CEM) END SEMESTER EXAMINATIONS

NOVEMBER 2018

SUBJECT: OPERATIONS RESEARCH AND DECISION THEORY [CIE 5102]

Date of Exam: **22 /11/2018** Time of Exam: **2:00 PM to 5:00 PM** Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed

1A.	Briefly explain (i) Decision under risk (ii) Aspiration level principle (iii) coefficient of optimism (iv) Saddle point in Games	**(04)**	**CO1**
1B.	A company wishes to buy new equipment A or B, 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 A is ₹ 12 Lakhs and of B is ₹ 9 Lakhs. Operating cost/year of A is estimated at ₹60,000 or ₹80,000 or ₹1, 00,000 while for B it is estimated at ₹ 1, 60,000 or ₹1, 80,000. 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) Hurwitz criterion	**(06)**	**CO1**
2A.	Solve the following LPP using graphical approach Maximize $Z = 5x_1 - 2x_2$ Subject to $x_1 \leq 2$ $-x_1 + 2x_2 \geq 4$ and $x_1, x_2 \geq 0$	**(02)**	**CO2**
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)**	**CO2**
3A.	Obtain the IBFS to the following transportation problem using Least Cost Method to minimize the cost which is shown in the table in thousands of ₹ (table below; Destinations across, Sources down)	**(03)**	**CO3**
3B.	Obtain the optimal solution to the following Transportation Problem using MODI (u-v) Method. The table shows unit transportation costs in thousands of **₹.** IBFS is supplied and indicated in **bold**	**(07)**	**CO3**

Table for 3A (Destinations):

Sources	D_1	D_2	D_3	Supply(units)
S_1	1	2	6	7
S_2	8	4	2	12
S_3	3	7	5	11
Demand(units)	10	10	10	

	Destinations Origins D_1 D_2 D_3 D_4 Supply(units) O_1 **25** 57 90 150 **10** 30 35 O_2 210 90 **35** 120 **10** 180 45 O_3 120 **40** 24 210 **50** 60 90 Demand(units) 25 40 35 70		
4A.	What is dynamic programming? Mention the application areas of dynamic programming	**(02)**	**CO5**
4B.	Solve the following Assignment problem. The pay-off matrix gives the profits in thousands of ₹ Buildings Modern Construction Techniques B_1 B_2 B_3 B_4 CT_1 280 224 196 308 CT_2 180 144 126 198 CT_3 220 176 154 242 CT_4 160 128 112 176	**(08)**	**CO4**
5A.	List the assumptions made in Poisson-Exponential, Multiple Server Model - Infinite population. Write the expression for the calculation of the probability that the system is idle	**03+01 =(04)**	**CO4**
5B.	The forest department plans to develop a PARK for tourism purpose. Four locations are designated for automobile access. These sites and the distances (in kilometers) between them are listed in the following table. To inflect the least harm on the environment, the department wants to minimize the distance of roadways required to provide the desired accessibility. Determine how roads should be built to achieve this objective. Make use of minimum span technique. Park Entrance / Water Fall / River Point / Sunset Point / Wild Life Area Park Entrance: --- 18 42 40 54 Water Fall: 18 --- 22 36 28 River Point: 42 22 --- 38 12 Sunset Point: 40 36 38 --- 37 Wild Life Area: 54 28 12 37 ---	**06**	**CO5**