

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad.**IVB.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, OCTOBER – 2017****SUBJECT: OPERATIONS RESEARCH**

(BRANCH: ME)

Time: 3 Hours

Max Marks: 75 Marks

Answer any 5 questions**5 x 15 M=75M**

1. a) Discuss in brief about the scope of OR

[5M]

b) Solve the following LPP by graphical Method

Maximize $Z=3x_1+2x_2$

Subjected to constraints

$$-2x_1 + x_2 \leq 1$$

$$x_1 \leq 2$$

$$x_1 + x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

[10M]

2. a) Solve the following transportation problem

[8M+7M]

	W1	W2	W3	W4	
F1	6	1	9	3	70
F2	11	5	2	8	55
F3	10	12	4	7	90
	85	35	50	45	

b) A company has 5 jobs to be done. The following matrix shows the return in rupees on assigning i^{th} machine to the j^{th} job. Assign the five jobs to the five machines so as to minimize the total expected profit.

	Jobs	A	B	C	D	E
	1	5	11	10	12	4
	2	2	4	6	3	5
Machines	3	3	12	5	14	6
	4	6	14	4	11	7
	5	7	9	8	12	5

3. a) Find the optimal sequence for the following job sequencing problem. Find the total elapsed time and the idle times of the machines. [8 M+7 M]

	A	B	C	D	E
M ₁	4	3	5	2	6
M ₂	6	7	5	8	4
M ₃	15	8	13	9	11

- b) A machine owner finds from his past records that the cost per year of maintaining a machine whose purchase price is Rs 6000 are as given below:

Year	1	2	3	4	5	6	7	8
Maintenance cost(Rs)	1000	1200	1400	1800	2300	2800	3400	4000
Resale Price(Rs)	3000	1500	750	375	200	200	200	200

Determine at what age is replacement due?

4. Solve the following game

$$A \begin{matrix} & B \\ \begin{bmatrix} 5 & -10 & 9 & 0 \\ 6 & 7 & 8 & 1 \\ 8 & 7 & 15 & 1 \\ 3 & 4 & -1 & 4 \end{bmatrix} \end{matrix}$$

5. At a railway station only one train is handled at a time. The yard can accommodate only two trains to wait. Arrival rate of trains is 6 per hour and railway station can handle them at the rate of 12 per hour. Find the steady state probabilities for the various number of trains in the system. Also find the average waiting time of a newly arriving train.
6. The annual demand of an item is 3500 units, cost of one procurement is Rs.150/- , cost of one unit is given as Rs.6. If 25% is extra invested over carrying charges. Determine EOQ, No of orders, time between two consecutive orders, total variable cost and total inventory cost.
7. Use DPP Method to
- $$\text{minimize } z = x_1 + 3x_2$$
- $$\text{subjected to } 2x_1 + 4x_2 \leq 60$$
- $$x_1 + 2x_2 \leq 40$$
- $$x_1, x_2 \geq 0$$

8. A bakery keeps stock plum cakes. Past experience shows that the daily demand of the cake has the probability distribution given below:

Daily demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

Using the random numbers 25, 39, 65, 76, 12, 05, 73, 89, 19, 49. Simulate the demand for the next 10 days.