

MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**IV B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS, NOVEMBER-2018**Subject: Operations Research

Branch: ME

Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions of the following

5x15M=75M

1. a) Using graphical method, solve following L.P.P. (6M)

Maximize $Z = 3x_1 - 2x_2$

Subject to the constraints: $x_1 - x_2 \geq 0$

$3x_1 - x_2 \leq 3$

Where $x_1, x_2 \geq 0$.

- b) Use simplex method to Maximize
- $Z = 5x_1 + 3x_2$
- , subject to the constraints: (9M)

$x_1 + x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$

$x_1, x_2 \geq 0$

2. A Marketing manager has five salesmen and five sales districts. Considering the capabilities of the salesmen and the nature of the districts, the marketing manager estimates that the sales per month (in hundred rupees) for each salesman in each district would be as follows:

Districts

		A	B	C	D	E
Salesman	1	32	38	40	28	40
	2	40	24	28	21	36
	3	41	27	33	30	37
	4	22	38	41	36	36
	5	29	33	40	35	39

Find the optimal assignment?

3. The data on the running costs per year and resale price of equipment A, whose purchase price is Rs 2,00,000 are as follows

Year	1	2	3	4	5	6	7
Running Cost (Rs)	30,000	38,000	46,000	58,000	72,000	90,000	1,10,000
Resale Value (rs)	1,00,000	50,000	25,000	12,000	8,000	8,000	8,000

- a) What is the optimum period of replacement? [8M]

- b) When equipment A is two years old, equipment B which is a new model for the same usage, is available. The optimum period for replacement is 4 years with an average cost of Rs 72,000. Should equipment A be changed with equipment B? If so when? [7M]

4. Solve the following game using

a) Sub games

(7M)

b) Graphical method

(8M)

	B				
		I	II	III	IV
	A	I	II	III	IV
	I	2	4	3	-1
	II	4	3	2	6

5. A Super market has two sales girls. The service time for each customer is 4 minutes on the average and the arrival rate is 10 per hour. Find

i) The probability that an arrival has to wait

ii) The expected percentage of idle time for each girl

iii) The expected waiting time of a customer in the system

[15M]

6. a) Annual demand for an item is 500 units, ordering cost is Rs.18 per order. Inventory carrying cost is 2% of the purchase price of items in the group. Relationship between price and quantity ordered

as follows:

(10M)

Quantity	1-15	16-149	150-549	550 and over
Price per	10	9	8.75	8.50

b) Explain the different inventory carry costs.

(5M)

7. A firm has divided its marketing area into three zones. The amount of sales depends upon the number of salesman in each zone. The firm has been collecting the data regarding sales and salesman in each area over a number of yrs. Profit (in 1000's Rs) is summarized in the table below. Now 9 salesmen are available and the problem is to allocate these salesmen to three different zones so that the total sales maximum.

No of salesman	Zone		
	1	2	3
0	30	35	42
1	45	45	54
2	60	52	60
3	70	64	70
4	79	72	82
5	90	82	95
6	98	93	102
7	105	98	110
8	100	100	110
9	90	100	110

8. a) Explain the Monte-carlo technique and its limitations? Explain any four application areas of simulation.

b) Customers arrive at milk booth for the required service. Assume that inter-arrival and service times are constant and given by 1.8 and 4 time units, respectively. Simulate the system for 14 time units. What is the average waiting time per customer? What is the percentage idle time of the facility? (Assume $t=0$)

[8M+7M]