

GOVERNMENT ENGINEERING COLLEGE ,BHUJ
MECHANICAL ENGINEERING DEPARTMENT
SEMESTER: 7th
SUBJECT: Operation Research
Assignment-2012

To study about basic of operation research

1. Define OR. Discuss the origin and development of OR?
2. What are the features of OR ?Discuss
3. What are the limitation of OR?

To study about linear programming

1. A chemical compound required minimum 80, 60, and maximum 90 unit of ingredients A, B and C respectively. Three type of chemicals are available in market containing these ingredients as under :

Chemical Ingradient/Unit	A	B	C	Cost/Unit
1	1	2	1	300
2	3	2	1	300
3	1	1	2	500

Formulate the problem as Linear programming.

2. Two product A & B are to be manufacture. One single unit of A required 2.4 min of punch press time and 5 min of assembly time . The profit of product A is Rs. 0.60 per unit .One single unit of B required 3 min of punch press time & 2.5 min of welding time . The profit for product B is 0.7 per unit .The capacity of the punch press department available for product is 1200 min/week .The welding department has an ideal capacity of 600 min/week and assembly department has 1500 min/week. Formulate the problem as linear programming.

3. Using graphical method to solve the following :

$$\begin{aligned} \text{Maximize } Z &= 3X_1 + 9X_2 \\ \text{Subject to: } X_1 + X_2 &\leq 8 \\ X_1 + X_2 &\leq 4 \\ X_1, X_2 &\geq 0 \end{aligned}$$

4. Using graphical method to solve the following:

$$\begin{aligned} \text{Maximize } W &= 2Y_1 + Y_2 \\ \text{Subject to: } Y_1 + 2Y_2 &\leq 10 \\ Y_1 + Y_2 &\leq 6 \\ Y_1 - Y_2 &\leq 2 \\ Y_1 - 2Y_2 &\leq 1 \\ Y_1, Y_2 &\geq 0 \end{aligned}$$

5. Solve the following LPP BY simplex method.

$$\begin{aligned} \text{Maximize } Z &= 3X_1 + X_2 \\ \text{Subject to: } 2X_1 + X_2 &\leq 5 \\ X_1 + X_2 &\leq 3 \\ X_1, X_2 &\geq 0 \end{aligned}$$

6. Solve the following LPP BY simplex method.

Maximize $Z = 70X_1 + 6X_2$

Subject to: $4X_1 + 6X_2 \leq 84$

$0.5X_1 + X_2 \leq 60$

$X_1, X_2 \geq 0$

7. Solve the following LPP by BIG M method;

Maximize $Z = 6X_1 + 4X_2$

Subject to: $2X_1 + X_2 \leq 30$

$3X_1 + 2X_2 \leq 24$

$X_1 + X_2 \geq 3$

$X_1, X_2 \geq 0$

8. Solve following:

Maximize $Z = 6X_1 + 4X_2$

Subject to: $2X_1 + X_2 \leq 30$

$3X_1 + 2X_2 \leq 24$

$X_1 + X_2 \geq 3$

$X_1, X_2 \geq 0$

9. Define following:

(1) Basic solution

(2) Basic feasible solution

(3) Degenerate solution

(4) Optimal feasible solution.

To study about transportation model

1. (North west corner method): The paper manufacturing company has three warehouse located in three different areas, say A, B and C . The company has to send from these warehouse to three destination , say D, E, and F. The availability from warehouse A, B and C, is 40, 60, and 70 units respectively. The demand at D, E, and F is 70 , 40, and 60 respectively. The transportation cost is shown in table:

	D	E	F	Supply
A	4	5	1	40
B	3	4	3	60
C	6	2	8	70
Demand	70	40	60	170

2. (Vogel’s method) The paper manufacturing company has three warehouses located in three different areas says A, B and C . The company has to sand from this warehouse from to three destination , says D, E and F . The availability from warehouse A, B, and C is 40 , 60 70 units. The demand at D, E ,and F is 70, 40 and 60 resp. the trans. Cost is . Use north west corner method to find out solution.

	D	E	F	Supply
A	4	5	1	40
B	3	4	3	60
C	6	2	8	70
Demand	70	40	60	170

3. (Maximization problem) A tv manufacturing company has three plants A, B, and C which manufacture two main products, a 14" B/W TV and 19" B/W TV having demand of 450 and 1050 units. A company is planning to manufacture 19" colour TV having demand of 600 units. The selling price of 14" B/W TV, 19" B/W TV and 19" colour TV are 15250, 19150, 21950 having respective demand of 450, 1050 and 600 units. The variable cost of three plants for each product is given below:

Plant	14" b/w TV	19" b/w TV	19" color TV	Supply
A	8000	8500	9250	800
B	7950	8600	9200	600
C	8100	8450	9300	700

Do some allocation for products in plants such that company can have max profit.

4. Compare the machines based on given future cost associated with it as given in the table.

Year(n)	1	2	3	4	5
Machine A	1200	1400	1500	1900	2200
Machine B	1000	1200	1700	1975	500

Value of money is assumed to be 10% per year. Determine which machine should be purchased.

To study about Queuing theory

1. Define a queue and classify queue. Also mention various application of queue.
2. Explain various terms used in queuing model.
3. Explain queuing discipline and its types.
4. What do you mean by queuing structure?
5. Explain:
 1. FCFS
 2. LCFS
 3. SIRO
6. Explain:
 1. Service time
 2. Idle time
 3. Rate of service
 4. Rate of arrival
 5. Utilization factor
7. Prove that for generalization model, length of the system is given by utilization factor.
8. At tax collection center, the customer arrives at 10 minutes and service time is 15 minutes. If the clerk does not allow to enter more than 5 customers, then find out:
 1. The availability that there is no line.
 2. Average number of customers in the system and their time in system.
 3. Average number of customers in the queue and waiting time in queue.
9. An enterprise is wishing to start a mall. They want to decide the number of bill collection counter. Customer arrive at every 4 minutes but the service and goods inspection time is 10 minutes. If they want to keep waiting for customer below 14 minutes, how many bill collection counters should be opened?

To study about network analysis

1. What is Critical Path ?what does it signify ?what are its benefit?
2. Explain following term with respect to CPM .
 - (i)EST
 - (ii)EFT
 - (iii)LST
 - (iv) LFT
3. Explain forward and backward planning with respect of CPM ?
4. How PERT differs from CPM.
5. An assembly of electrical bus – bar is as follows. Construt the network digram for the assembly of the electric bus- bar .

Activity	Description	Predecessor
A	Open job order	-
B	Get copper material	A
C	Get hardware and consumable material	A
D	Cutting of copper material	B
E	Bending of copper piece	D
F	De-burring of copper piece	E
G	Polices sthe copper pieces	F,C
H	Testing of bus bar	G
I	Dispatch of bus bar	H

6. Determine the critical path for given activity and find out floats?

Activity	Duration	Activity	Duration	Activity	Duration
1-2	5	3-5	1	7-8	1
1-3	6	4-6	1	7-9	4
2-6	8	5-7	2	2-9	4
3-4	1	6-8	3	8-9	3

7. i) Critical path using PERT.
 ii) Calculate variance and standard daviation for each activity. iii) Calculate the probability of completing the project in 26 days.

Activity	T _o	T _m	T _p	Activity	T _o	T _m	T _p
1-2	6	9	12	3-5	1	15	5
1-3	3	4	11	2-6	5	6	7
2-4	2	5	14	4-6	7	8	15
3-4	4	6	8	5-6	1	2	3

8. For the previous example calculate the probability of completing the project in 20 days.