

IV B.Tech I Semester Supplementary Examinations, April/May 2005
OPERATIONS RESEARCH
 (Common to Mechanical Engineering, Mechatronics and Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) What are the major assumptions in a Linear Programming model?
 (b) Discuss in brief Duality in linear programming
2. A company has three plants at locations A,B and C which supply to warehouses located at D,E,F,G and H. Monthly plant capacities are 800 , 500 and 400 units respectively. Unit transportation costs (in hundreds of rupees) are given below :

From/To	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	6
C	8	4	6	6	3

Monthly warehouse requirements are 400, 400, 500, 400 and 800 units respectively. By using Vogels Approximation Method determine on optimum distribution for company, in order to minimize the total transportation cost.

3. A book binder has one printing press, one binding machine and manuscripts of five different books the time required to perform the printing and binding operations for each book are known. Determine the order in which books should be processed, in order to minimize the total time required to turn-out all the books.

Block	I	II	III	IV	V
M ₁ (Painting Machine)	3	7	4	5	7
M ₂ (Painting Machine)	6	2	7	3	4

Also find the total elapsed time and idle times of each machine

4. (a) Running cost and resale value of a small machine whose purchase price is Rs.6000 are given below

Year	1	2	3	4	5	6	7
Running cost(Rs.)	1000	1200	1400	1800	2300	2800	3400
Resale value(Rs.)	3000	1500	750	375	200	200	200

Determine at what age replacement is due?

- (b) Let the owner has three of above type machines, two of which are two years old. Now he is considering a new type of equipment with 50% more capacity

than one of the old ones at a unit price of Rs.8000 with the running costs and resale price as follows:

Year	1	2	3	4	5	6	7	8
Running cost (Rs.)	1200	1500	1800	2000	3100	4000	5000	6100
Resale price (Rs.)	4000	2000	1000	500	300	300	300	300

Assuming the loss of flexibility due to fewer machines is of no importance and that he will continue to have sufficient work for three of the old machine, what should his policy be?

5. (a) In a certain game, player 'A' has three possible choices L,M and N. While player B has two possible choices P and Q. Payments are to be made according to the choices made.

Choices	Payment
L,P	A pays B Rs.3
L,Q	B pays A Rs.3
M,P	A pays B Rs.2
M,Q	B pays A Rs.4
N,P	B pays A Rs.2
N,Q	B pays A Rs.3

What are the best strategies for the players A and B in this game? What is the value of the game for A and B?

- (b) write a note on 'value of the game' and 'zero sum game'
6. A computer shop has a laser printer. The jobs for laser printing are randomly distributed approximating a Poisson distribution with mean service rate of 10 jobs per hour, since job pages vary in length (pages to be printed). The jobs arrive at a rate of 6 per hour during the entire 8 hours workday. If the laser printer is valued Rs.30/- per hour, determine
- The percent time an arriving job has to wait
 - Average system time
 - Average idle time cost of the printer per day.
7. (a) Explain selective inventory control and state the different selection techniques adopted in inventory control systems. Give a brief note on each.
- (b) Find the economic order quantity for the given data below:
- Annual demand: 5000 units
 Unit cost of the item: Rs 20 per unit
 Ordering cost: Rs 300 per order
 Inventory holding cost: 20% of the unit cost
8. A distance network consists of 11 nodes which are distributed as shown in figure. Find the shortest path from node 1 to node 11 and also the corresponding distances.

Arc	Distance	Arc	Distance
1-2	8	5-7	8
1-3	7	5-8	1
1-4	4	6-9	3
1-5	2	6-10	5
2-6	4	7-9	5
3-6	8	7-10	1
3-7	4	8-10	5
4-7	6	9-11	5
		10-11	5
