

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – COMPUTER SC.

FIFTH SEMESTER – APRIL 2010

CS 5503 - RESOURCE MANAGEMENT TECHNIQUES

Date & Time: 23/04/2010 / 1:00 - 4:00 Dept. No.

Max. : 100 Marks

SECTION-A

ANSWER ALL THE QUESTIONS:

(10 x 2 = 20)

1. Write a General form of LPP.
2. Write a note on slack and surplus variables.
3. Write down the conditions for solving transportation problem.
4. What is degenerate solution?
5. What is sequencing?
6. Differentiate optimistic and pessimistic time estimate.
7. Define critical path.
8. What is Reorder level?
9. What is setup cost?
10. What is present worth factor?

SECTION-B

ANSWER ALL THE QUESTIONS:

(5 x 8 = 40)

11. a) A company makes two kinds of leather belts. Belt A is a high quality belt, and belt B is of lower quality. The respective profits are Rs.4 and Rs. 3 per belt. Each belt of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 per day. The supply of leathers is sufficient for only 800 belts per day (Both A and B combined). Belt A requires a fancy buckle and only 400 per day are available. There are only 700 buckles a day available for belt B. Determine the optimal product mix using graphical method.

(OR)

- b) Use graphical method to solve the following L.P.P:

Maximize $Z = 4x_1 + 3x_2$ subject to the constraints :

$$2x_1 + x_2 \leq 1000, \quad x_1 + x_2 \leq 800,$$

$$x_1 \leq 400, \quad x_2 \leq 700$$

$$x_1, x_2 \geq 0$$

- 12 a) A marketing manager has 5 salesmen and 5 sales districts. Considering the capabilities of the salesman and the nature of districts, the marketing manager estimates that sales per month (in hundred rupees) for each salesman in each district would be as follows:

Salesman	Sales District				
	A	B	C	D	E
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

What is the maximum sale that may be expected if an optimum assignment is made?

(OR)

b) Obtain an initial basic feasible solution to the following transportation Problem using the north-west corner rule.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirements	200	225	275	250	

13. a) Find the sequence that minimizes the total elapsed time (in Hrs) required to complete the following task on 2 machine.

Jobs	J1	J2	J3	J4	J5	J6
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

(OR)

b) (i) Write down the difference between PERT & CPM. (4)

(ii) Define the following terms:

a) dummy activity b) total float (4)

14. a) The annual demand for an item is 3200 units. The unit cost is Rs. 6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs. 150/- determine (i) Economic order quantity (ii) time between two consecutive orders (iii) number of order per year (iv) the optimal total cost.

(OR)

b) A stockiest has to supply 12,000 units of a product per year to his customer. The demand is fixed and known and the shortage cost is assumed to be infinite. The inventory holding cost is Re.0.20 per unit per month and the ordering cost per order is Rs.350. Determine the following

(i) The optimum lot size q_0

(ii) Optimum scheduling period t_0

(iii) Minimum total variable yearly cost.

15 a) An automobile manufacturer purchases 2,400 casting over a period of 360 days. This requirement is fixed and known. The castings are subject to quantity discounts. Determine the optimal purchase quantity and if

$K_{11} = \text{Rs.}1,000$

$0 < q < 1,000$

$K_{12} = \text{Rs.} 950$

$q \geq 1,000$

Cost of ordering $C_3 = \text{Rs.}70,000$

Cost of shortage $C_1 = \text{Rs.}0.12\%$ of the unit cost.

(OR)

b) A Taxi owner estimates from his past records that the cost per year for operating a taxi whose purchase price when new is Rs.60,000 are given below.

Age	1	2	3	4	5
Operating cost	10,000	12,000	15,000	18,000	20,000

After 5 years the operating cost is Rs.6000 K where $K=6,7,8,9,10$ (K is the age in year). If the resale value decreases by 10% of the purchase price each year what is the best replacement policy?

SECTION-C

ANSWER ANY TWO QUESTIONS:

(2 x 20 = 40)

16. i) Solve the following L.P.P by simplex method

Maximize $Z = 2x_1 + 3x_2$ subject to the constraints:

$$x_1 + 3x_2 \leq 6 \quad (10)$$

$$3x_1 + 2x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

ii) A steel firm has 4 plants which purchase coal for their production from 3 mines. The cost of shipping (in 100's of RS.) one ton of coal from each mine to each plant are given below:

		Plants				Capacity
Mines		P1	P2	P3	P4	
	M1	3	1	4	5	50
	M2	7	3	8	6	50
	M3	2	3	9	2	75
Requirements		40	55	60	20	

How much coal should the firm purchase from each mine in order to satisfy the demand of the plants at minimal shipping expenses.(Using Matrix minimum method) **(10)**

17. i) Given the following data:

Job	1	2	3	4	5	6
Machine A	12	10	9	14	7	9
Machine B	7	6	6	5	4	4
Machine C	6	5	6	4	2	4

Order of Processing : ACB

Determine the optimal sequence & the total elapsed time associated with it. **(10)**

ii) Given the following information:

Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
a	3	2	6	2	5	3	3	1	4
m	6	5	12	5	11	6	9	4	19
b	15	14	30	8	17	15	27	7	28

- i) Draw the Project Network
- ii) Find the length and variance of each activity.
- iii) Find the critical path.
- iv) Find the length and variance of the critical path. **(10)**

18. (i) Machine A cost Rs.9000. Annual operating costs are Rs.200 for the first year, and then increase by Rs.2000 every year. Determine the best age at which to replace the machine. If the optimum replacement policy is followed, what will be the average yearly cost of owning and operating the machine?

Machine B cost Rs.10000. Annual operating costs are Rs.400 for the first year and then increase by Rs.800 every year. You now have a machine of type A which is one year old. Should you replace it with B, if so when? **(10)**

(ii) The cost of a new machine is Rs.5000. The maintenance cost of n th year is given by $C_n = 500(n-1)$; $n=1, 2, 3, \dots$. Suppose that the discount rate per year is 0.05. After how many years it will be economical to replace the machine by a new one? **(10)**
