



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE**

**FIFTH SEMESTER – APRIL 2016**

**CS 5503 - RESOURCE MANAGEMENT TECHNIQUES**

Date: 26-04-2016  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

## PART-A

Answer ALL questions

10 X 2=20

1. Define operation research.
2. What are the slack and surplus variables?
3. Write the objective of the travelling salesman problem.
4. What is the condition for non-degenerate solution of Transportation problem?
5. What is network in a network diagram?
6. How to calculate the idle time in sequencing problem?
7. Write the formula for optimum lot size of inventory with shortage.
8. Define Lead time.
9. Mention the situations for replacement of material?
10. What is present worth factor?

## PART-B

Answer ALL questions

5 X 8=40

11 a) Explain the scope of OR.

(OR)

b) A paper mill produces 2 grades of paper namely X and Y. Because of rawmaterial restrictions, it cannot produce more than 400 tonnes of grade X and 300tonnes of grade Y in a week. There are 160 production hours in a week. Itrequires 0.2 and 0.4 hours to produce a ton of products X and Y respectively withcorresponding profits of Rs.200 and Rs. 500 per ton. Formulate the above as a LPP to maximize profit and find the optimum product mix (graphical method).

12 a) (i) What is transportation problem?

(ii) Obtain an initial basic feasible solution using least cost rule.

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	
O <sub>1</sub>	2	7	4	5
O <sub>2</sub>	3	3	1	8
O <sub>3</sub>	5	4	7	7
O <sub>4</sub>	1	6	2	14
	7	9	18	

(OR)

- b) (i) How do you convert the maximization assignment problem into a minimization one?  
(ii) A department has five employees with five jobs to be performed. The time (in hours) each man will take to perform each job is given in the effectiveness matrix.

	Employees				
	I	II	III	IV	V
A	10	15	13	15	16
B	13	9	18	13	10
C	10	9	12	12	12
D	15	11	9	9	12
E	11	9	10	14	12

How should the jobs be allocated, one per employee, so as to minimize the total man-hours?

- 13 a) A book binder has one printing press, one binding machine and manuscripts of 7 different books. The times required for performing printing and binding operations for different books are shown below

Book	1	2	3	4	5	6	7
Printing(hrs)	20	90	80	20	120	15	65
Binding(hrs)	25	60	75	30	90	35	50

Decide the optimum sequence of processing of books in order to minimize the total time required to bring out all the books.

(OR)

- b) A project schedule has the following characteristics.

Activity	(1,2)	(1,3)	(2,4)	(3,4)	(3,5)	(4,9)	(5,6)	(5,7)	(6,8)	(7,8)	(8,10)	(9,10)
Time (days)	4	1	1	1	6	5	4	8	1	2	5	7

From the above table

- (1) Construct a network diagram
- (2) Determine the critical path and total project duration.

- 14 a) (i) Define holding cost and ordering cost

(ii) A factory requires 3600 kg of raw material for producing an item per year. The cost of placing an order is Rs.36 and holding cost of the stock is Rs.2.50 per kg per year. Determine the EOQ and number of run per year.

(OR)

- b) The annual consumption of an item is 2000 items. The ordering cost is Rs.100 per order. The carrying cost is Rs0.80 per unit per year. Assuming working days as 200 lead time 20 days, and safety stock 100 units. Calculate (a)EOQ (b) the number of orders per year. (c) Reorder level. (d)the total annual ordering and carrying cost.

15a) Assume that the present value of 1 Re to be spend in a year time is Rs0.9 and the capital cost is Rs.3000 and the maintenance cost are given below when should the machine be replaced?

Year	: 1	2	3	4	5	6	7
Maintenance cost	: 500	600	800	1000	1300	1600	2000

(OR)

b) A fleet owner finds from his past records that the costs per year of running a vehicle whose purchase price is Rs.50,000 are as under:

year	1	2	3	4	5	6	7
Running cost(Rs)	5000	6000	7000	9000	12500	16000	18000
Resale value(Rs)	30000	15000	7500	3750	2000	2000	2000

Thereafter, running cost increases by Rs.2,000 but resale value remains constant at Rs.2,000. At what age is the replacement due?

### PART C

Answer any TWO

2 X 20=40

16 a) Use simplex method to solve the following L.P.P

$$\begin{aligned} \text{Maximize } Z &= x_1 - x_2 + 3x_3 \\ \text{Subject to } &x_1 + x_2 + x_3 \leq 10 \\ &2x_1 - x_3 \leq 3 \\ &2x_1 - 2x_2 + 3x_3 \leq 0 \\ &x_1, x_2, x_3 \geq 0 \end{aligned}$$

b) Solve the transportation problem

	D1	D2	D3	D4	D5	SUPPLY
S1	4	2	3	2	6	8
S2	5	4	5	2	1	12
S3	6	5	4	7	3	14

DEMAND 4 4 6 8 8

Formulate this problem into transportation problem and find the optimal solution.

17 a) We have six jobs, each of which must go through machines A, B, C in order ABC

Processing time (hrs) are given in the table

Job	:	1	2	3	4	5	6
Machine A	:	8	3	7	2	5	1
Machine B	:	3	4	5	2	1	6
Machine C	:	8	7	6	9	10	9

Determine the sequence of jobs that will minimize the elapsed time.

b) The following table shows the jobs of a network along with their time estimates

Task	:	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
Optimistic time:		3	2	6	2	5	3	1	3	4
Pessimistic time:		15	14	30	8	17	15	7	27	28
Most likely time:		6	5	12	5	11	6	4	9	19

(i) Draw the project network

(ii) Find the critical path.

(iii) Find the probability that the project is completed in 31 days.

18 a) The demand for an item is 12000 per year and the shortage is allowed. If the unit cost is Rs.15 and the holding cost is Rs.20 per year per unit determine the optimum total yearly cost. The cost of placing one order is Rs.6000 and the cost of one shortage is Rs.100 per year.

b) There are two types of autorickshaws, type A and type B. The purchase prices of these two types are Rs.7000 and Rs.9000 respectively. The resale values and running costs for the two types are given below

Type-A

Year	1	2	3	4	5	6	7
Running cost	1100	1300	1500	1900	2400	2900	4100
Resale price	3100	1600	850	475	300	300	300

Type-B

Year	1	2	3	4	5	6	7
Running cost	1300	1600	1900	2500	3200	4100	5100
Resale price	4100	2100	1150	600	400	400	400

Determine which type of autorickshaw is to be purchased.

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