

# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



## B.C.A.DEGREE EXAMINATION –COMPUTER APPLICATIONS

FOURTH SEMESTER – APRIL 2018

### CA 4203– RESOURCE MANAGEMENT TECHNIQUES

Date: 02-05-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

#### SECTION-A

Answer ALL the Questions:

(10 x 2 = 20)

1. Define slack and surplus variables.
2. What is unbound solution? How does it occur in graphical method?
3. What is meant by degeneracy in transportation problem?
4. What are the differences between the transportation problem and the assignment problem?
5. What is sequencing problem?
6. Write down difference between PERT & CPM.
7. What is inventory?
8. What is buffer stock?
9. What is meant by individual replacement?
10. What is present worth factor?

#### SECTION-B

Answer ALL the Questions:

(5 x 8 = 40)

11.a) Use the graphical method to solve the following Linear Programming Problem.

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

$$-2x_1 + x_2 \leq 1, x_1 \leq 2, x_1 + x_2 \leq 3 \& x_1, x_2 \geq 0$$

Or

b) Use simplex method to solve the following Linear Programming Problem.

Maximize  $Z=5x_1 - 4x_2 + 3x_3$  subject to the constraints

$$x_1 + 2x_2 + x_3 - 3x_4 \leq 8, -x_2 + x_3 + 2x_4 \leq 0,$$

$$2x_1 + 7x_2 - 5x_3 - 10x_4 \leq 21, \& x_1, x_2, x_3, x_4 \geq 0$$

12 a) A batch of 4 jobs can be assigned to 5 different machines. The setup time (in hours) for each job on various machines is given below.

		Machines				
		1	2	3	4	5
Job	1	10	11	4	2	8
	2	7	11	10	14	12
	3	5	6	9	12	14
	4	13	15	11	10	7

Find an optimal assignment of jobs to machines which will minimize the total setup time.

Or

b) Find the initial basic feasible solution for the following transportation problem by North West Corner Rule.

		Distribution centre				
		D1	D2	D3	D4	Availability
Origin	S1	11	13	17	14	250
	S2	16	18	14	10	300
	S3	21	24	13	10	400
Requirements		200	225	275	250	

13.a) Find the sequence that minimize the total elapsed time required to complete the following task on machine's M1 and M2 in the order M1,M2. Also, Find the minimum total elapsed time.

Task	A	B	C	D	E	F	G	H	I
M1	2	5	4	9	6	8	7	5	4
M2	6	8	7	4	3	9	3	8	11

Or

b) Calculate the earliest start, earliest finish, latest start & latest finish of each activity of the project given below and determine the Critical path of the project.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration(weeks)	8	7	12	4	10	3	5	10	7	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) the economic order quantity (ii) time between two consecutive orders (iii) number of orders per year (iv) the optimal cost.

Or

b) The demand for an item in a company is 18000 units per year, and the company can produce the item at a rate of 3000 per month. The cost of one setup is Rs.500 and the holding cost of one unit per month is 15 paise. The shortage cost of one unit is Rs.20 per month. Determine the optimum manufacturing quantity and the number of shortages. Also determine the manufacturing time and time between setups.

15.a) Machine A cost Rs.9000, Annual operating cost is Rs.200 for the first year and then increases by Rs.2000 every year. Determine the optimum replacement policy. Machine B costs Rs.10000; Annual operating cost is Rs.400 and then increased by Rs.800 every year. You now own a machine A which is one year old. Should you replace it with B?

Or

b) The cost of a machine is Rs.6100 and its scrap value is Rs.100. The maintenance costs found from experience are as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost	100	250	400	600	900	1200	1600	2000

When should the machine be replaced?

### SECTION-C

Answer any TWO Questions:

(10 X 2=20 marks)

16.a) Use simplex method to the following LPP Max  $Z = 3x_1 + 5x_2$  subject to  $x_1 \leq 4$ ,  $3x_1 + 2x_2 \leq 18$  and  $x_1, x_2 \geq 0$ .

b) Solve the transportation problem

		Destination				Supply
		A	B	C	D	
Source	1	6	1	9	3	70
	2	11	5	2	8	55
	3	10	12	4	7	70
Demand		85	35	50	45	

17. a) Three time estimates (in months) of all activities of a project are as given below.

Activity	Optimistic time, a	Most likely time, m	Pessimistic time, b
1-2	0.8	1.0	1.2
2-3	3.7	5.6	9.9
2-4	6.2	6.6	15.4
3-4	2.1	2.7	6.1
4-5	0.8	3.4	3.6
5-6	0.9	1.0	1.0

(i) Find the expected duration & standard deviation of each activity.

(ii) Construct the project network

(iii) Determine the critical path, expected project length & expected variance of project length.

b) A manufacturer has to supply his customer with 600 units of his products per year. Shortage are not allowed and storage cost amounts to 60 paise per unit per year. The setup cost is Rs.80. Find

- a) the economic order quantity
- b) the minimum average yearly cost
- c) the optimum number of orders per year
- d) the optimum period of supply per optimum order

18. a) A machine owner finds from his past records that the cost per year of maintaining a machine whose purchase price is Rs.6000 are as given below:

Year	1	2	3	4	5	6
<b>Maintenance cost</b>	1000	1200	1400	1800	2300	2800
<b>Resale value</b>	3000	1500	750	375	200	200

Determine at what age is replacement due?

b) Solve the following travelling salesman problem

		<b>To</b>				
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>From</b>	<b>A</b>	-	3	6	2	3
	<b>B</b>	3	-	5	2	3
	<b>C</b>	6	5	-	6	4
	<b>D</b>	2	2	6	-	6
	<b>E</b>	3	3	4	6	-

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