LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – **APRIL 2016**

CA 4203 - RESOURCE MANAGEMENT TECHNIQUES

Date: 27-04-2016 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

SECTION-A

ANSWER ALL THE QUESTIONS: **(10X2=20)**

1. Write a note on slack variables.
2. Write down the equality constraints:
   Max $Z = 3x_1-5x_2$ subject to the constraints:
   $$2x_1 + x_2 \geq 2$$
   $$X_1 + 3x_2 = 3$$
   $$X_2 \leq 4$$
   $$X_1, x_2 \geq 0$$
3. What do you mean by unbalanced transportation problem?
4. Write down the route condition for the traveling salesman problem.
5. What is no passing rule?
6. What does PERT stand for? What is the objective of PERT?
7. Define dummy Activity
8. Define Inventory.
9. What is setup cost?
10. List the types of situation for replacement.

SECTION-B

ANSWER ALL THE QUESTIONS: **(5X8=40)**

11. a) A company manufacturers two products A and B in two departments namely assembly department and painting department. It takes two hours in the assembling department and one hour in painting department to manufacture one unit of product A. It takes two hours in the assembling department and 2 hours in painting department for manufacturing one unit of product B. The assembling department works for three 8 hours shift per day and painting department works two 8 hours shift per day. The profit of the product A is Rs.100 and the profit of the product B is Rs.150 per unit. Formulate the problem to maximize the profit for the company.

(OR)

b) Solve the following LPP by Graphical method:
Max $Z = 3x_1 + 5x_2$ Subject to the constraints:
$x_1 + 2x_2 \leq 2000$, $x_1 + x_2 \leq 1500$, $x_2 \leq 600$, $x_1, x_2 \geq 0$

12. a) Obtain an initial basic feasible solution to the following transportation Problem using North-West Corner Rule.

	D	E	F	G	Available
A	6	8	8	5	30
B	5	11	9	7	40
C	8	9	7	13	50
Requirements	35	28	32	25	

(OR)

b) Solve the following assignment problem:

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

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	5	9	4	7	8	6
Machine B	7	4	8	3	9	5

(OR)

b)A is the operation on the project. B&C can be done concurrently & both must follow A**.** B must proceed D**.** E can not begin until both B&C are completed. F is dependent on the completion of both D&E. F is the last operation on the project. Draw the arrow network and number the nodes according to Fulkerson's Rule.

14. a) Define the following Terms:

a) Reorder Level b) Reorder Point

c) Safety stock d) Shortage

(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 is 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) The cost of a machine is Rs.6000.The resale value and the maintenance costs every year are given below.

Year	1	2	3	4	5	6
Maintenance Cost	1000	1200	1400	1800	2300	2800
Resale Value	3000	1500	750	325	200	200

Determine the best time for replacing the machine.

(OR)

b) A machine cost Rs. 6100. The scrap value is Rs.100. The maintenance costs are given below.

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: **(2X20=40)**

16. i) Show that the LPP given below has unbounded solution. **(10)**

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

$$x_1 - x_2 \leq 10$$
$$2x_1 - x_2 \leq 40$$
$$x_1, x_2 \geq 0$$

ii) A firm has 3 factories producing certain product and it is to be transported to five distribution centers. The unit transportation cost (in 100's of Rupees) from factories to the distribution center are given below.

		Distribution Centers				
Factories		D1	D2	D3	D4	D5
	F1	3	2	3	4	1
	F2	4	1	2	4	2
	F3	1	0	5	3	2

Total productions of F1,F2 & F3 are 100,125,75 and the demands of distribution centers D1,D2,D3,D4 & D5 are 100,60,40,75,25 units respectively. Determine the transportation pattern to minimize the overall shipping cost.(Using VAM) **(10)**

17. i) Find the sequence that minimizes the total elapsed time (in Hrs) required to complete the following task on 2 machines. Also calculate total elapsed time and idle time of each machine. **(10)**

Tasks	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**`I**
Machine 1	2	5	4	9	6	8	7	5	4
Machine 2	6	8	7	4	3	9	3	8	11

ii) Given the following information:

Activity	1-2	1-3	2-3	2-4	2-5	3-4	4-7	5-6	5-7	6-7
a	3	1	6	0	2	3	6	1	2	4
m	4	2	8	0	5	5	9	1	5	8
b	5	3	10	0	8	7	12	1	8	12

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) A particular item has a demand of 9,000 units/year. The cost of one procurement is Rs.100 and the holding cost per unit is Rs.2.40 per year. The replacement is instantaneous and no shortages are allowed. Determine
   (i) The economic lot size,
   (ii) The number of orders per year,
   (iii) The time between orders,
   (iv) The total cost per year if the cost of one unit is Re.1. **(10)**

ii) A machine costs Rs.900.The annual operating cost is Rs.200 for the first year and is then increasing by Rs.2000 per year for subsequent years. There is no scrap value. Determine the best age to replace the machine. **(10)**

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