LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – NOVEMBER 2016

16UCS1AL01 - OPERATION RESEARCH

Date: 09-11-2016   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

SECTION-A

ANSWER ALL THE QUESTIONS: (10X2=20)

1. Define slack variable.

2. What are the limitations of graphical method?

3. When is transportation problem said to be unbalanced? Give an example.

4. Write down the condition for solving assignment problem.

5. What is Total elapsed time?

6. What is idle time?

7. Define critical path.

8. Differentiate optimistic and pessimistic time estimate.

9. Define Inventory.

10. What is carrying cost?

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. How many units of product A and B to be manufactured so as to maximize the profit for the company?

(OR)

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

12. a) Obtain an initial basic feasible solution to the following transportation
    Problem using the Row minimum method.

	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	

(OR)

b) 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 sales that may be expected if an optimum assignment is made?

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

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

(OR)

b) The maintenance cost and the resale price of a truck are given below.

Year	1	2	3	4	5	6	7	8
Maitenance Cost	1000	1300	1700	2200	2900	3800	4800	6000
Resale Price	4000	2000	1200	600	500	400	400	400

The purchase price of the truck is Rs.8000. Determine the time at which it is profitable to replace the truck.

14. a) Differentiate PERT and CPM.

(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.

15.a) Explain the various cost associated with Inventory.

(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.

SECTION-C

ANSWER ANY TWO QUESTIONS: (2X20=40)

16. i) Solve by Simplex method : **(10)**

Max $Z = 3x_1 + 2x_2 + 5x_3$ Subject to the constraints:

$x_1 + 2x_2 + x_3$ 430 , $3x_1 + 0x_2 + 2x_3$ 460 , $x_1 + 4x_{2+} 0x_3$ 420 , x_1, x_2, x_3 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				
		D1	D2	D3	D4	D5
Factories	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)   A Readymade garments manufacturer has to process 7 items through three stages of production namely cutting, sewing &packing. The times taken for each of these at the different stages are given below in the appropriate units.

	Item	1	2	3	4	5	6	7
Processing Time	Cutting	5	7	3	4	6	7	12
	Sewing	2	6	7	5	9	5	8
	Packing	10	12	11	13	12	10	11

Find an order in which these items are to be processed, so as to minimize the time taken to process all the items through all the three stages. Also find the total elapsed time and idle time of each machine.

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) Define the following Terms:
        a) Reorder Level   b) Reorder Point   **(10)**
         c) Safety stock   d) Shortage

   (ii) 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)**

****