



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.C.A. DEGREE EXAMINATION – COMPUTER APPLICATIONS

FIRST SEMESTER – APRIL 2017

16UCS1AL01- OPERATION RESEARCH

Date: 02-05-2017
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

SECTION-A

ANSWER ALL THE QUESTIONS:

(10X2=20)

1. Define Operations Research.
2. What is unbounded solution?
3. Write down the conditions for solving the transportation problem.
4. Write down the route condition for the traveling salesman problem.
5. State job sequencing problem.
6. What is idle time?
7. Define dummy Activity.
8. What does PERT stand for? What is the objective of PERT?
9. What is setup cost?
10. Differentiate Reorder level and Reorder point.

SECTION-B

ANSWER ALL THE QUESTIONS:

(5X8=40)

11. a) A company has three operational departments (weaving, processing and Packing) with capacity to produce three different types of clothes namely suiting, shirting and woollens yielding a profit of Rs.2, Rs.4 and Rs.3 per metre respectively. One metre of suiting requires 3 minutes in weaving, 2 minutes in processing and 1 minute in packing. Similarly one metre of shirting requires 4 minutes in weaving, 1 minute in processing and 3 minutes in packing. One metre of woollen requires 3 minutes in each department. In a week total run time of each department is 60,40 and 80 hours for weaving, processing and packing respectively. Formulate the linear programming problem to find the product mix to maximize the profit.

(OR)

b) Solve the following LPP by Graphical method:

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

$$x_1 + 2x_2 \leq 2000, \quad x_1 + x_2 \leq 1500, \quad x_2 \leq 600, \quad x_1, x_2 \geq 0$$

10. a) Obtain an initial basic feasible solution to the following transportation Problem using Least cost method.

	D	E	F	G	Available
A	1	2	3	4	6
B	4	3	2	0	8
C	0	2	2	1	10
Requirements	4	6	8	6	

(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	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

(OR)

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

Year	1	2	3	4	5	6	7	8
Maintenance 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) Define the following Terms:

- i) Activity
- ii) Event
- iii) Network
- iv) Dangling

(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 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

- (10) 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 $Z = 4x_1 + 10x_2$ Subject to the constraints:

$$\begin{aligned} 2x_1 + x_2 &\leq 50 \\ 2x_1 + 5x_2 &\leq 100 \end{aligned}$$

$$2x_1 + 3x_2 < 90$$

$$x_1, x_2 \geq 0$$

ii) A company has 3 plants at located A, B & C. Supply warehouses located at D,E, F,G & H. monthly plant capacity are 800, 500 & 900 units respectively. Monthly warehouses requirements are 400,400,500,400 & 800 respectively. Unit transportation costs are given below:

		Warehouses				
		D	E	F	G	H
Plants	A	5	8	6	6	3
	B	4	7	7	6	6
	C	8	4	6	6	3

Determine an optimum distribution for a company in order to minimize the total transportation 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	1-6	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) Define the following Terms:

- | | | |
|------------------|------------------|------|
| a) Reorder Level | b) Reorder Point | (10) |
| c) Safety stock | d) Shortage | |

(ii) 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 the following (i) Economic order quality (ii) time between two consecutive orders (iii) number of order per year (iv) the optimal total cost. (10)

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