V

(20516) Roll No. .....

BCA-IV Sem.

18019

B. C. A. Examination, May 2016

OPTIMIZATION TECHNIQUES

(BCA-404)

(New)

Time : Three Hours] *[Maximum Marks : 75*

Note : Attempt questions from all Sections as per instructions.

Section-A
(Very Short Answer Questions)

Attempt all the *five* questions of this Section. Each question carries 3 marks. Very short answer is required not exceeding 75 words. 3×5=15

1. Define a general and standard linear programming problem.

2. Solve the following LPP by graphical method :

Maximize : $z = 2x_1 + x_2$

Subject to : $3x_1 + 4x_2 \le 6$

$6x_1 + x_2 \le 3$

$x_1, x_2 \ge 0.$

3. Customers arrive at a booking office window, being manned by a single individual at a rate of 25 per hour. Time required to serve a customer has exponential distribution with a mean of 120 seconds. Find the mean waiting time of a customer in the queue.

4. Draw economic order quantity graph showing the relationship of inventory costs with order quantity and inventory level overtime.

5. Explain briefly replacement policies for items whose efficiency deteriorates with time.

Section-B
(Short Answer Questions)

Attempt any *two* questions from this Section. Each question carries 7½ marks. 7½×2=15

6. Find the sequence that minimizes total elapsed time to complete the following six jobs and also find the minimum time :

Jobs :	1	2	3	4	5	6
MachineI :	3	12	15	6	10	9
MachineII :	8	10	10	6	12	3

7. Solve the following assignment problem represented by the matrix :

	I	II	III	IV	V
A	6	5	8	11	16
B	1	13	16	1	10
C	16	11	8	8	8
D	9	14	12	10	16
E	10	13	11	8	16

8. Obtain the steady state equations for the model {(M/M/1):(∞/FCFS)} and also find the formula for mean and the variance of the queue length.

Section-C

(Detailed Answer Questions)

Attempt any *three* questions from this Section. Each question carries 15 marks. 15×3=45

9. Determine an optimum basic feasible solution to the transportation problem given below :

	D_1	D_2	D_3	D_4	
O_1	1	2	3	4	6
O_2	4	3	2	0	8 Capacity
O_3	0	2	2	1	10
	4	6	8	6	24
	Demand				

where O_i and D_j denote ith origin and jth destination respectively.

10. Use simplex method to solve the following LPP :

Maximize : $Z = 4x_1 + 10x_2$

Subject to : $2x_1 + x_2 \le 50$

$2x_1 + 5x_2 \le 100$

$2x_1 + 3x_2 \le 90$

$x_1, x_2 \ge 0$

11. Obtain the dual problem of the following LPP :

Maximize : $f(x) = 2x_1 + 5x_2 + 6x_3$

Subject to : $5x_1 + 6x_2 - x_3 \le 6$

$-2x_1 + x_2 + 4x_3 \le 4$

$x_1 - 5x_2 + 3x_3 \le 1$

$-3x_1 - 3x_2 + 7x_3 \le 6$

$x_1, x_2, x_3 \ge 0$

Also verify that the dual of the dual problem is the primal problem.

12. Derive the Wilson EOQ formula. What are the practical limitations of EOQ formula? Also discuss the costs involved in an inventory problem.

13. Explain the following :
    (i) Present worth factor (pwf)
    (ii) Discount rate
    (iii) Dual simplex method
    (iv) Group replacement and individual replacement policy
    (v) Tie-tac problem.