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END SEMESTER EXAMINATION, JUNE - 2019
BCA FIFTH SEMESTER

COURSE CODE: BCA304 **COURSE TITLE: OPTIMIZATION TECHNIQUES**

[Time allotted: Three hours] **[Max. Marks: 100]**

Note: *Attempt all Sections & Questions.*

Section (A)

Q.1. Attempt all questions. **(2 x 10 = 20)**

a. A linear programming technique improves the quality of ……..

b. A…….……..variable represent amounts by which solution values exceed a resource.

c. In two-phase method, an……variable is never considered for re-entry into the basis.

d. The saddle point of the following table is……..

15	2	3
6	5	7
-7	4	0

e. The saddle point of the following table is……..

2	4	5
10	7	8
4	5	6

f. While solving a linear programming model graphically, the area bounded by the constraints is called…..

g. For a maximization problem the objective function coefficient for an artificial variable is…….

h. The……method is useful for game with larger payoff matrix without saddle point.

i. The amount of time that is expected to complete the activity is called……

j. Expected length of non-empty queue is given by

Section (B)

Q.2. Attempt any 5 questions. **(7 x 5 = 35)**

a. Find the optimal solution of given transportation problem by lowest cost entry method

	I	II	III	IV	V	Capacity
A	12	4	9	5	9	55
B	6	1	6	6	7	45
C	1	12	4	7	7	30
D	10	15	6	9	1	50
Demand	40	20	50	30	40	

b. Solve given assignment problem

	I	II	III	IV	V	VI
A	13	13	16	23	19	9
B	11	19	26	16	17	18
C	12	11	4	9	6	10
D	7	15	9	14	14	13
E	9	13	12	8	14	11

c. Solve the following LPP by graphical method

$$\text{Max.} Z = 3x_1 + 9x_2$$

s.t. $x_1 + x_2 \le 1$; $-3x_1 + x_2 \ge 3$; $x_1, x_2 \ge 0$

d. Solve the following LPP

$$\text{Max.} Z = -x_1 + 3x_2 - 2x_3$$

$$\text{s.t. } 3x_1 - 4x_2 + 2x_3 \le 7 \;;\; -2x_1 + 4x_2 \le 12 \;;\; -4x_1 + 3x_2 + 8x_3 \le 10 \quad x_1, x_2, x_3 \ge 0$$

e. Solve the following LPP

$$\text{Max.} Z = 5x_1 + 3x_2$$

$$\text{s.t. } 2x_1 + x_2 \le 1 \;;\; x_1 + 4x_2 \ge 6 \;;\; x_1, x_2 \ge 0$$

f. Solve the following LPP by dual simplex method

$$\text{Min } Z = 3x_1 + x_2$$

$$\text{s.t. } x_1 + x_2 \ge 1 \;;\; 2x_1 + 3x_2 \ge 2 \quad x_1, x_2 \ge 0$$

g. Find the optimal strategy for each of the player and the value of the game

6	-3
-3	0

Section (C)

Attempt any 3 questions. **(15 x 3 = 45)**

Q.3. Solve the following game by simplex method .Find the optimal strategy and value of game

1	-1	3
3	5	-3
6	2	-2

Q.4.A project has the following activities and other characteristics

Activity	Preceding Activity	Optimistic Time (a)	Pessimistic Time(m)	Most likely Time(b)
A	-	4	5	12
B	A	3	4.5	15
C	A	2	3	4
D	C	6	8	22
E	B	4	6	8
F	C	3	4	5
G	D,E	1.5	3	4.5
H	B	5	7	15
I	H	3	4	5
J	G,I	2	4	6

i. Draw the network diagram for the project.
ii. Identify the critical path.
iii. Prepare the activity schedule for the project.
iv. Determine the mean project completion time.
v. Find the probability that the project is completed in 20 days.

Q.5. Consider a situation where the mean arrival time (λ) is one customer every 4 minutes and the mean service time ($\frac{1}{\mu}$) is 2.5 minutes. Calculate the average number of customers in the system, average queue length, the average time a customer spend in the system and the average time a customer wait before being served.

Q.6. Determine the optimal sequence of job which minimizes the total elapsed time based on the following information.

Job	A	B	C
1	3	3	5
2	8	4	8
3	7	2	10
4	5	1	7
5	2	5	6

Q.7. The production department of a company requires 3600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs 36 and the holding cost is Rs 2.5 per kg per year. Help the purchase manager to determine the

- **i.** Annual ordering cost.
- **ii.** The optimal lot size.
- **iii.** The minimum yearly total inventory cost.

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