Roll No.													

PRESIDENCY UNIVERSITY
BENGALURU
SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22
Course Code: CSE 226
Course Name: Optimization Techniques
Program & Sem: B.Tech & 6th Semester

Date: 27.04.2022
Time: 01:30PM to 02:30PM
Max Marks: 30
Weightage: 15%

Instructions:

(i) Read the questions properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (4Q x 2M = 8M)

1. A company produces 2 models M1 and M2, each unit of M1 and M2 gives profit of $10 and $20 respectively. It takes 2 hours to produce each unit of model M1 and 3 hours to produce each unit of model M2 and the number of available hours per week is 50. Write the LPP of the problem. (C.O.No.1) [Comprehension]
2. In graphical method, the points in the common region satisfying all the constraints simultaneously is called _____. (C.O.No.1) [Comprehension]
3. In simplex method, if the pivot column (new column) has the element 0, then the solution is _____. (C.O.No.2) [Comprehension]
4. If the objective function is of minimization type in the simplex method and if the optimal solution is Max $z^* = -20$ attains at $x = 2$ and $y = 5$, then the original solution is _____ which is attained at _____. (C.O.No.2) [Comprehension]

Part B [Thought-Provoking Questions]

Answer both the Questions. Each question carries SIX marks. (2Q x 6M = 12M)

5. A computer company manufactures laptops & desktops that fetches profit of Rs. 700/- & Rs. 500/- per unit respectively. Each unit of laptop takes 4 hours of assembly time & 2 hours of testing time while each unit of desktop requires 3 hours of assembly time & 1 hour for testing. In a given month the total number of hours

available for assembly is 210 hours & for inspection is 90 hours. Formulate the problem as LPP in such a way that the total profit is maximum.

(C.O.No.1) [Comprehension]

6. Solve the following LPP by means of the graphical method

Maximize $z = 100x_1 + 40x_2$

subject to the constraints

$$5x_1 + 2x_2 \leq 1000$$
$$3x_1 + 2x_2 \leq 900$$
$$x_1 + 2x_2 \leq 500$$
$$x_1,\ x_2 \geq 0$$

(C.O.No.1) [Comprehension]

Part C [Problem Solving Questions]

Answer the following Question. Question carries 10 marks. (1Q x 10M = 10M)

7. Solve the following LPP using the simplex method

Maximize $z = 2x + 4y$

subject to the constraints

$$3x + y \leq 22$$
$$2x + 3y \leq 24$$
$$x,\ y \geq 0$$

(C.O.No.2) [Comprehension]

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TEST 2

Winter Semester: 2021-22
Course Code: CSE 226
Course Name: Optimization Techniques
Program & Sem.: B.Tech & 6th Semester

Date: 2nd June 2022
Time: 01:30 PM to 02:30 PM
Max Marks: 30M
Weightage: 15%

Instructions:

(i) Read the questions properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the questions. Each question carries TWO marks. (4Q x 2M = 8M)

1. If an artificial variable is present in the optimum basis with positive level in Big-M method, then the solution of the LPP is _____. (C.O.No.2) [Comprehension]

2. The LPP associated with another LPP is called _____. (C.O.No.2) [Comprehension]

3. If the sum of supplies and the sum of demands are equal, then the transportation problem is said to be _____. (C.O.No.3) [Comprehension]

4. According to the least cost method, if the transportation problem is unbalanced, then the solution of the problem is _____. (C.O.No.3) [Comprehension]

Part B [Thought-Provoking Questions]

Answer both the questions. Each question carries SIX marks. (2Qx6M =12M)

5. Convert the following primal problem into its dual problem.

Minimize $Z = 2x_1 + 3x_2$

subject to the constraints

$$-3x_1 + 9x_2 \leq 10$$

$$x_1 + 2x_2 = 5$$

$$x_1, x_2 \geq 0$$

(C.O.No.2) [Comprehension]

6. Solve the following transportation problem by the Vogel's approximation method.

	D_1	D_2	D_3	D_4	Supply
O_1	11	13	17	14	**250**
O_2	16	18	14	10	**300**
O_3	21	24	13	10	**400**
Demand	**200**	**225**	**275**	**250**	

(C.O.No.3) [Comprehension]

Part C [Problem Solving Questions]

Answer the following question. The question carries TEN marks. (1Qx10M =10M)

7. Use duality to solve the following LPP

Maximize $Z = 3x + 4y$

subject to the constraints

$$x - y \leq 1$$
$$x + y \geq 4$$
$$x - 3y \leq 3$$
$$x, y \geq 0$$

(C.O.No.2) [Comprehension]

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END TERM EXAMINATION

Winter Semester: 2021-22
Course Code: CSE226
Course Name: Optimization Techniques
Program & Sem: B. Tech & VI Sem

Date: 4th July 2022
Time: 09.30 AM to 12.30 PM
Max Marks: 100
Weightage: 50 %

Instructions:

(iv) Read all the questions carefully and answer accordingly.
(v) Scientific and non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the questions. Each question carries TWO marks. (10Q x 2M = 20M)

1. The constraints of LPP may be in the form of _____ (or) _____. (C.O.No.1) [Knowledge]

2. The set of values of decision variables x_j $(j = 1, 2, \ldots, n)$ that satisfy all the constraints and non-negativity conditions of LPP is called _____. (C.O.No.1) [Knowledge]

3. The area which is bounded by all the constraints including all the boundary points is called _____. (C.O.No.1) [Knowledge]

4. For maximization LPP model, the simplex method is terminated when all values of indicator are _____. (C.O.No.2) [Knowledge]

5. The dual of the dual problem is known as _____. (C.O.No.2) [Knowledge]

6. When the total supply is equal to the total demand in a transportation problem, the problem is said to be _____. (C.O.No.3) [Knowledge]

7. The method used for solving an assignment problem is called _____.

   (C.O.No.3) [Knowledge]

8. An activity which must be completed before one or more other activities start is known as _____.
   (C.O.No.4) [Knowledge]

9. Draw the network diagram for the following project: activity C must follow the activity A, and the activity D must follow A and B.
   (C.O.No.4) [Knowledge]

10. A case of disconnect activity before the completion of all activities is known as _____. (C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the questions. Each question carries TEN marks. (5Q x 10M = 50M)

11. Solve the following LPP using the graphical method

    Minimize $z = 3x_1 + 2x_2$

    subject to

    $$5x_1 + x_2 \geq 10$$
    $$x_1 + x_2 \geq 6$$
    $$x_1 + 4x_2 \geq 12$$
    $$x_1,\ x_2 \geq 0$$

    (C.O.No.1) [Comprehension]

12. Solve by using Big-M method

    Maximize $z = 3x_1 + 2x_2$

    subject to

    $$2x_1 + x_2 \leq 2$$
    $$3x_1 + 4x_2 \geq 12$$
    $$x_1,\ x_2 \geq 0$$

    (C.O.No.2) [Comprehension]

13. Use the duality to solve the following LPP

Maximize $Z = 3x + 4y$

subject to

$$x - y \leq 1$$
$$x + y \geq 4$$
$$x - 3y \leq 3$$
$$x,\ y \geq 0$$

(C.O.No.2)

[Comprehension]

14. Obtain the initial basic feasible solution for the following transportation problem using North-West corner rule and Vogel's approximation method.

	D1	D2	D3	D4	D5	Supply
O1	2	11	10	3	7	4
O2	1	4	7	2	1	8
O3	3	9	4	8	12	9
Demand	3	3	4	5	6	

(C.O.No.3)

[Comprehension]

15. Draw the network diagram, determine the critical path and the total duration of the following project.

Activity	$1-2$	$1-3$	$1-5$	$2-3$	$2-4$	$3-4$	$3-5$	$3-6$	$4-6$	$5-6$
Duration	8	7	12	4	10	3	5	10	7	4

(C.O.No.4)
[Comprehension]

Part C [Problem Solving Questions]

Answer both the questions. Each question carries FIFTEEN marks. (2Q x 15M = 30M)

16. Solve the following using the simplex method

Maximize $z = 3x + 4y$

subject to

$$2x + y \leq 40$$
$$2x + 5y \leq 180$$
$$x, y \geq 0.$$

(C.O.No.2)

[Comprehension]

17. A company is producing a single product and selling it through five agencies situated in different cities. All of a sudden, there is a demand for the product in five more cities that do not have any agency of the company. The company is faced with the problem of deciding on how to assign the existing agencies to dispatch the product to the additional cities in such a way that the travelling distance is minimized. The distances (in km) between the surplus and deficit cities are given in the following distance matrix.

Deficit city / Surplus city	I	II	III	IV	V
A	160	130	175	190	200
B	135	120	130	160	175
C	140	110	155	170	185
D	50	50	80	80	110
E	55	35	70	80	105

Determine the optimum assignment schedule. (C.O.No.3)

[Comprehension]