15901

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.CSE-2022/Dip.CSE-2023
Course Name – Operations Research
Course Code - DCSE-OE501B
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose the correct option: The Operations Research came into existence

a) in the year 1940
b) in the business context
c) during World War I
d) during World War II

(ii)

Choose from below:

Operations Research achieved recognition as a subject of academic study in the year

a) 1949
b) 1950
c) 1953
d) 1957

(iii) Choose “Operations Research approach is”

a) intuitive
b) objective
c) multi-disciplinary
d) all of these

(iv) Write “A model in Operations Research is”

a) an approximation
b) an idealization
c) an essence of reality
d) all of these

(v) Choose “A physical model is an example of”

a) Iconic model
b) Analogue model
c) Verbal model
d) Symbolic model

(vi) Select the one that is not correct.

a) a model should be simple and coherent

b) a model should not take much time in its construction for any problem

c) A model representing the typical budget of business accounts is called "account model"

d) a model which has the probability of measuring observations is called "qualitative model"

(vii) Select the wrong one

a) Models are only an attempt in understanding operations and should never be considered as absolute in any case

b) Iconic models are pictorial representation of real system

c) Heuristic model are particular cases of Iconic models

d) Analogue models are most abstract than iconic ones

(viii) Identify the characteristic of Operations Research

a) Narrow-focused

b) System-oriented

c) Time-consuming

d) Resource-intensive

(ix) Identify the key concept in Operations Research

a) Flexibility

b) Optimization

c) Innovation

d) Creativity

(x) Select the approach of Operations Research

a) Holistic

b) Problem-oriented

c) Product-oriented

d) Process-oriented

(xi) Consider the LP problem:

Minimize $2X_1 + 6X_2$

subject to

$X_1 + X_2 \geq 4$

$2X_1 + 3X_2 \leq 6$

$X_1, X_2 \geq 0$

Choose the standard form.

a) Maximize $-2X_1 - 6X_2$

subject to

$X_1 + X_2 - X_3 = 4$

$2X_1 + 3X_2 + X_4 = 6$

$X_1, X_2, X_3, X_4 \geq 0$

b) Minimize $2X_1 + 6X_2$

subject to

$X_1 + X_2 + X_3 = 4$

$2X_1 + 3X_2 + X_4 = 6$

$X_1, X_2, X_3, X_4 \geq 0$

c) Maximize $-2X_1 - 6X_2$

subject to

$X_1 + X_2 \geq 4$

$2X_1 + 3X_2 \leq 6$

$X_1, X_2 \geq 0$

d) None of these

(xii) Consider the LP problem:

Maximize $2X_1 + 3X_2$

subject to

$X_1 + X_2 \geq 5$

$5X_1 + 6X_2 \geq 12$

$X_1, X_2 \geq 0$

Select the correct standard form.

a) Maximize $2X_1 + 3X_2$

subject to

$X_1 + X_2 - X_3 = 5$

$5X_1 + 6X_2 - X_4 = 4$

$X_1, X_2, X_3, X_4 \geq 0$

b) Minimize $-2X_1 - 3X_2$

subject to

$X_1 + X_2 - X_3 = 5$

$5X_1 + 6X_2 - X_4 = 4$

$X_1, X_2, X_3, X_4 \geq 0$

c) Maximize $2X_1 + 3X_2$

subject to

$X_1 + X_2 + X_3 = 5$

$5X_1 + 6X_2 + X_4 = 4$

$X_1, X_2, X_3, X_4 \geq 0$

d) None of these

(xiii) Consider the LP problem:

Maximize $5X_1 + 6X_2$

subject to

$X_1 + 2X_2 \leq 7$

$3X_1 + 5X_2 \leq 13$

$X_1, X_2 \geq 0$

Select the correct standard form.

a) Maximize $5X_1 + 6X_2$

subject to

$X_1 + 2X_2 - X_3 = 5$

$3X_1 + 5X_2 - X_4 = 13$

$X_1, X_2, X_3, X_4 \geq 0$

b) Maximize $5X_1 + 6X_2$

subject to

$X_1 + 2X_2 + X_3 = 5$

$3X_1 + 5X_2 + X_4 = 13$

$X_1, X_2, X_3, X_4 \geq 0$

c) Minimize $-5X_1 - 6X_2$

d) None of these

subject to

$X_1 + 2X_2 + X_3 = 5$

$3X_1 + 5X_2 + X_4 = 13$

$X_1, X_2, X_3, X_4 \geq 0$

(xiv) Choose the correct one:

The Simplex method was developed by

a) George Dantzig
b) John von Neumann
c) Leonid Kantorovich
d) Robert Solow

(xv) Choose correct option from the following:

The Simplex method moves from one

a) Basic feasible solution to another
b) Infeasible solution to a feasible solution
c) Optimal solution to a suboptimal solution
d) None of these

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Consider the LP problem: Maximize $5x_1 + 6x_2$ subject to $x_1 + 2x_2 \leq 7$, $3x_1 + 5x_2 \leq 13$ and $x_1, x_2 \geq 0$ Write this into standard form (3)
3. Illustrate the difference between feasible solution and basic feasible solution in Linear Programming (3)
4. Explain the term operations Research (OR) and its significance in decision-making processes (3)
5. Calculate one iteration of the simplex method for the problem Max $z = 3x_1 + 2x_2$ subject to: $2x_1 + x_2 \leq 8$, $x_1 + x_2 \leq 5$ and $x_1, x_2 \geq 0$ (3)
6. Construct the L.P.P in standard maximization form: Min $Z = x_1 + 5x_2 + 9x_3$ Subject to $x_1 + 5x_2 + 2x_3 \leq 10$, $2x_1 + 6x_2 - 7x_3 \geq 20$, $4x_1 + 5x_3 = 50$, $2x_2 + 5x_3 \leq 80$ for $x_1, x_2, x_3 \geq 0$ (3)

OR

Using graphical method to illustrate the solution of the following L.P.P. Max $Z = 5x + 6y$ Subject to, $x + y \leq 20$, $2x + 3y \leq 30$ and $x, y \geq 0$ (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Using graphical method to illustrate the solution of the L.P.P. Max $Z = 10x + 7y$ Subject to, $2x + y \leq 10$, $x + 2y \leq 30$ and $x, y \geq 0$ (5)
8. Construct the L.P.P in standard maximization form: Max $z = x_1 + 6x_2 + 3x_3$ Subject to $x_1 + x_2 + 10x_3 \leq 50$, $3x_1 + 5x_2 - 7x_3 \geq 60$, $2x_1 + 3x_3 = 60$ and $x_2 + 4x_3 \leq 80$ for $x_1, x_2, x_3 \geq 0$ (5)
9. Illustrate the L.P.P in standard maximization form: Maximize Z = x1 + 3x2 + 6x3 Subject to: 2x1 + x2 + 7x3 <= 40, x1 + 9x2 - 5x3 >= 70, 5x1 + 3x3 = 150, 3x2 + 4x3 <= 100 and x1, x2, x3 >= 0 (5)
10. Evaluate the dual of the following L.P.P: Minimize $Z = 4x_1 + 8x_2 + 3x_3$ Subject to $x_1 + x_2 \geq 2$, $x_1 + 2x_2 + 3x_3 \leq 5$, for $x_1, x_2, x_3 \geq 0$ (5)
11. Evaluate the dual of the following L.P.P: Maximize $Z = 2x_1 + 9x_2 + x_3$ Subject to $x_1 + 4x_2 + 2x_3 \geq 5$, $3x_1 + x_2 + 2x_3 \geq 4$ for $x_1, x_2, x_3 \geq 0$ (5)
12. Use Simplex method to evaluate the solution of the LPP Max $z = 4x_1 + 3x_2$ Subject to, $3x_1 + 4x_2 \leq 12$, $3x_1 + 3x_2 \leq 10$, $2x_1 + x_2 \leq 4$ and $x_1, x_2 \geq 0$ (5)

OR

Evaluate the effectiveness of the graphical solution method versus the simplex method for solving LPPs. (5)

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