



DG-3157

B. Sc. (Sem. V) Examination

March / April - 2016

Mathematics (EG)

(Operations Research - I)

Time : Hours]

[Total Marks : 50

Instructions :

(1)

नीचे दशांशवेष निशानीवाणी विगतो उत्तरवही पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. SC. (SEM. V)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="MATHEMATICS (EG)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="3"/> <input type="text" value="1"/> <input type="text" value="5"/> <input type="text" value="7"/>	<input type="text" value="Student's Signature"/>
Section No. (1, 2,...): <input type="text" value="Nil"/>	

- (2) All questions are compulsory.
- (3) Figures to the right indicate marks of the question.
- (4) Follow usual notations.
- (5) Use of non-programmable calculator is allowed.

1 (a) Answer any **THREE** as directed. [06]

- (1) What is linear programming?
- (2) Define: Slack variables.
- (3) Define: Initial feasible solution.
- (4) State the general form of LPP.
- (5) Define: Basic solution.

(b) Write the dual of the following LPP. (Any **ONE**) [04]

(1) Maximize $Z_x = x_1 - 2x_2 + 3x_3$

Subject to the constraints

$$-2x_1 + x_2 + 3x_3 = 2$$

$$2x_1 + 3x_2 + 4x_3 = 1$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

- (2) Minimize $Z_x = 2x_1 + 3x_2 + 4x_3$
 Subject to the constraints
 $2x_1 + 32x_2 + 5x_3 \geq 2$
 $3x_1 + x_2 + 7x_3 = 30$
 $x_1 + 4x_2 + 6x_3 \geq 10$
 and $x_1, x_2, x_3 \geq 0$

2 Attempt any TWO.

[20]

- (1) Use graphical method to solve the following LPP.

Minimize $Z = 4x_1 - 2x_2$
 Subject to the constraints
 $x_1 + x_2 \leq 14$
 $3x_1 + 2x_2 \geq 36$
 $2x_1 + x_2 \leq 24$
 and $x_1, x_2 \geq 0$

- (2) Use graphical method to solve the following LPP.

Maximize $Z = 20x_1 + 30x_2$
 Subject to the constraints
 $3x_1 + 3x_2 \leq 36$
 $5x_1 + 2x_2 \leq 50$
 $2x_1 + 6x_2 \leq 60$
 and $x_1, x_2 \geq 0$

- (3) Use Simplex method to solve the following LPP.

Maximize $Z = x_1 + 4x_2 + 5x_3$
 Subject to the constraints
 $3x_1 + 3x_2 \leq 22$
 $3x_1 + 2x_2 \leq 14$
 $x_1 + 2x_2 + 3x_3 \leq 14$
 and $x_1, x_2, x_3 \geq 0$

- (4) Use Simplex method to solve the following LPP.

Maximize $Z = 30x_1 + 40x_2 + 20x_3$
 Subject to the constraints
 $10x_1 + 12x_2 + 7x_3 \leq 10$
 $7x_1 + 10x_2 + 8x_3 \leq 8$
 $x_1 + x_2 + x_3 \leq 10$
 and $x_1, x_2, x_3 \geq 0$

3 Attempt any TWO.

[20]

- (1) Use Two-phase method to solve the following LPP.

$$\text{Minimize } Z = 5x_1 + 8x_2$$

Subject to the constraints

$$3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$\text{and } x_1, x_2 \geq 0$$

- (2) Use Two-phase method to solve the following LPP.

$$\text{Minimize } Z = 3x_1 + 2x_2$$

Subject to the constraints

$$2x_1 + x_2 \geq 2$$

$$3x_1 + 4x_2 \geq 12$$

$$\text{and } x_1, x_2 \geq 0$$

- (3) Use Big-M method to solve the following LPP.

$$\text{Maximize } Z = 2x_1 + 3x_2 + 10x_3$$

Subject to the constraint

$$x_1 + 2x_3 = 2$$

$$x_2 + x_3 = 1$$

$$\text{and } x_1, x_2, x_3 \geq 0$$

- (4) Use Big-M method to solve the following LPP.

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

Subject to the constraints

$$2x_1 + 4x_2 \leq 12$$

$$2x_1 + 2x_2 = 10$$

$$5x_1 + 2x_2 \geq 10$$

$$\text{and } x_1, x_2 \geq 0$$