

3<sup>rd</sup> Semester Regular/Back Examination 2017-18

## Optimization Techniques

BRANCH : M.Sc.(MH)

Time: 3 Hours

Max Marks: 70

Q.CODE: B571

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 Answer the following questions : (2 x 10)

- Define feasible Region?
- What is degeneracy in LPP?
- State the difference between TP and AP.
- What is an assignment problem give two application ?
- Define a Queue.
- Define Payoff in Game Theory.
- What do mean by Sequencing?
- What do you mean by Stepping Stone method.
- What do you mean by Duality.
- What is Decision theory ?

Q2 a) Solve THE NON LINEAR PROGRAMMING PROBLEM by Lagrange's (5)

multipliers Maximize  $Z = (x_1)^2 + (x_2)^2 + 3x_1 + 4x_2$  Subject to the constraints:  $2x_1 + x_2 = 10$  and  $x_1, x_2 \geq 0$

b) Solve the DYNAMIC PROGRAMMING PROBLEM Maximize  $Z = b_1x_1 +$  (5)

$b_2x_2 + b_3x_3 + \dots + b_nx_n$  where  $x_1 + x_2 + \dots + x_n = C$  and  $x_i \geq 0$

Q3 a) Solve the L.P.P. BRANCH &amp; BOUND METHOD (5)

Minimize  $Z = 4x_1 + 3x_2$ 

Subject to the constraints:

$$5x_1 + 3x_2 \geq 30$$

$$x_1 \leq 4, x_2 \leq 6$$

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

b) Find the DUAL OF THE FOLLOWING PRIMAL (5)

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

$$4x_1 + 5x_2 + 6x_3 = 10$$

$$7x_1 + 8x_2 + 9x_3 = 20$$

$$x_1, x_2, x_3 \geq 0$$

Q4 a) Solve BY FIBONACCI SEARCH METHOD Minimize  $f(x) = x^2 + 54/x$  (5)

(0,5]

b) Solve the LPP BY KUHN TUCKER CONDITIONS (5)

Maximize  $Z = -(x_1)^2 - (x_2)^2 - (x_3)^2 + 4x_1 + 6$ 

Subject to the constraints:

$$x_1 + x_2 \leq 2$$

$$2x_1 + 3x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

- Q5 a)** Solve GOLDEN SECTION SEARCH METHOD Minimize  $f(x) = x^2 + 54x$  (5)  
(0,5]
- b)** Use Two Phase Simplex method to solve the L.P.P. : (5)  
Maximize  $Z = 2x_1 + x_2 + x_3$   
Subject to the constraints:  $4x_1 + 6x_2 + 3x_3 \leq 8$   
 $3x_1 - 6x_2 - 4x_3 \leq 1$   
 $2x_1 + 3x_2 - 5x_3 \geq 4$   
 $x_1, x_2, x_3 \geq 0$ .
- Q6 a)** Solve the 2x3 Game by graphical method (5)
- |   |   |    |
|---|---|----|
| 1 | 3 | 11 |
| 8 | 5 | 2  |
- b)** Determine a Sequence for five jobs and minimize total elapsed time (5)
- |           |   |   |   |   |    |
|-----------|---|---|---|---|----|
| JOB       | 1 | 2 | 3 | 4 | 5  |
| MACHINE A | 5 | 1 | 9 | 3 | 10 |
| MACHINE B | 2 | 6 | 7 | 8 | 4  |
- Q7** Solve the GOAL PROGRAMMING PROBLEM (10)  
Minimize  $Z = d$   
S.T  $120x_1 + 90x_2 = 2100$   
 $6x_1 + 3x_2 \leq 90$   
 $3x_1 + 6x_2 \leq 72$   
 $x_1, x_2 \geq 0$
- Q8** Write short notes on : (5 x 2)  
a) Sensitivity Analysis  
b) Transportation and Assignment Method