H.T.No. | | | | | | | | | | |

Code No: MA2902 **GEC-R17**

M. Tech I Semester Regular Examinations, February 2018

LINEAR AND NONLINEAR OPTIMIZATION

(Common to Power Electronics & Electric Drives and Embedded Systems)

Time: 3 Hours **Max. Marks: 60**

Note: Answer any **FIVE** questions. All Questions carry equal Marks.

5 × 12 = 60M

1. a) Write step by step procedure to solve an LPP by graphical method. (4M)

   b) Find the optimum solution of the following linear programming problem by using the Big - M method. Max $Z = 3x_1 - x_2$ Subject to $2x_1 + x_2 \geq 2$, $x_1 + 3x_2 \leq 3$, $x_2 \leq 4$ and $x_1 \geq 0$, $x_2 \geq 0$. (8M)

2. a) What are classical optimization techniques? Discuss any two limitations of classical optimization techniques. (4M)

   b) Find the maximum and minimum values of the function $f(x)= 12x^5-45x^4+40x^3+5$. (8M)

3. a) Explain the condition for Multivariable optimization with equality constraints. (4M)

   b) Find the dimensions of a box of largest volume that can be inscribed in a sphere of unit radius. (8M)

4. a) What is Gradient? Explain its significance in Non-linear optimization. (4M)

   b) Minimize $f(x_1, x_2) = x_1^2 - 2x_1+1+x_2^2$ using steepest descent method. Take starting point (0,0). (8M)

5. a) What is Unconstrained Optimization? (4M)

   b) Obtain the solution using the Lagrange multiplier method (8M)

   Minimize $z= x_1^2+ x_2^2 + x_3^2$

   Subject to:

   $4x_1 + x_2^2 + 2x_3=6$

   $x_1, x_2, x_3 \geq 0$

6. a) Explain the significance of Geometric Programming. (4M)

   b) Minimize $f(x) =x_1^2+ 2x_2^2+ 3x_3^2$ subject to the constraints using Kuhn-Tucker conditions $g_1= x_1-x_2-2x_3 \leq 12$

   $g_2=x_1+2x_2-3x_3 \leq 8$ (8M)

7. a) What are the similarities and differences between conventional and evolution algorithms. (6M)

b) Explain the genetic operators Cross over, Mutation and Reproduction with suitable examples. (6M)

8. a) Give the graphical representation of the ant colony optimization process in the form of multi layered network. (8M)

b) Explain briefly path retracing. (4M)

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