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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Ph.D Course Work Examination December 2019

03 ME 6261 OPTIMIZATION TECHNIQUES FOR ENGINEERING

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

(Answer all Questions)

PART A

(4x5=20 Marks)

I. State the necessary and sufficient conditions for the maximum of a multivariable function f(x).

II. Prove that any local minimum of a convex function f(x) is a global minimum.

III. Explain the computational procedure in dynamic programming.

IV. Explain calculus of variation with any one application.

PART B

V. A.) Find the Taylor's series approximation of the function $f(x_1,x_2,x_3)=x_2^2x_3+x_1e^{x3}$ about the point. x*=(1,0,-2). (7)

OR

B.) Find the min value of a function $f(x)= x^2+54/x$ using quadratic estimation method. (7)

VI. A) Use Wolfe's method to solve the following quadratic programming problem:

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

Subject to: $2x_1+3x_2 <=6;$

$2x_1+x_2 <=4;$ $x_1,x_2 >=0$ (7)

OR

B) Determine whether the following optimization problem is convex, concave, or neither type: Minimize $f =-4x_1 +x_1^2 -2x_1x_2 +2x_2^2$

subject to $2x_1 +x_2 \leq 6,$ $x_1 -4x_2 \leq 0,$

$x_i \geq 0,$ $i = 1,2.$ (7)

VII. A) Minimize $f = -3x_1 - 4x_2$ subject to $3x_1 - x_2 + x_3 = 12$

$3x_1 + 11x_2 + x_4 = 66$; $x_i >= 0$;

Using simplex method. (13)

OR

B) i) Explain branch and bounce method. (6)

ii) Explain Gomorys method for all integer programming problems. (7)

VIII. A) Given two points A and B in a vertical plane, using variational methods find the path from A to B along which a particle of mass m will slide under the force of gravity without friction in the shortest time. (13)

OR

B) Explain about weak and strong extrema. What are the sufficient conditions for weak and strong extrema? (13)