M. Tech. morning

D. 28/05/2014

Seat NO. ------

GANPAT UNIVERSITY

M. TECH. SEMESTER II ELECTRONICS & COMMUNICATION ENGINEERING
REGULAR EXAMINATION, MAY-JUNE 2014
3EC202 LINEAR AND NONLINEAR OPTIMIZATION

Time: 3 H0URS. **TOTAL Marks: 70**

Instructions:

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks. Assume suitable data, if necessary.

SECTION-I

QUE.1 (A) Explain Art of Modeling and Model Building in Development of an optimization model.

(B) Briefly describe the Engineering application of Optimization.

OR

QUE.1 (A) Find the extreme Points of function $f(x1,x2)= x_1^3 + x_2^3 + 2x_1^2 + 4x_2^2 + 6$

(B) Find the dimensions of a cylindrical tin (with top and bottom) made up of sheet metal to maximize its volume such that the total surface area is equal to $A_0 = 24\pi$.

QUE.2 (A) What are the representation of genetic algorithms and explain them.

(B) What is optimization? Define Basic component of optimization.

OR

QUE.2 (A) Write and explain different type of Classification based on the nature of the equations involved.

(B) Minimize $f(X)= x_1^2+x_2^2+60x_1$

subject to the constraints $g_1= x_1-80\geq 0$

$g_2= x_1+x_2-120\geq 0$

Using Kuhn-Tucker conditions.

QUE.3 (A) State and Prove the necessary conditions and sufficient conditions for function of a single variable.

(B) Find the stationary points of $f(X) = 2x_1^3 - 2x_1x_2 - 5x_1 + 2x_2^2 + 4x_2 + 5$ and classify them as relative maxima, relative minima or neither.

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SECTION-II

QUE.4 (A) Explain the Dual Simplex Method with its algorithm. 5

(B) Solve the following LPP using simplex method 7

Minimize $Z = 4x_1 - x_2 + 2x_3$

subject to the constraints $2x_1 + x_2 + 2x_3 \leq 6$

$x_1 - 4x_2 + 2x_3 \leq 0$

$5x_1 - 2x_2 - 2x_3 \leq 4$

$x_1, x_2, x_3 \geq 0$

OR

QUE.4 (A) Solve the following LP Problem graphically. 7

Maximize $z = 6x + 5y$

Subject to constraint $2x - 3y \leq 5$

$x + 3y \leq 11$

$4x + y \leq 15$

$x, y \geq 0$

(B) Explain the Motivation of the simplex method.

QUE.5 (A) Find all the basic solution corresponding to the system of the equation 6

$2x_1 + 3x_2 - 2x_3 - 7x_4 = 1$

$x_1 + x_2 + x_3 + 3x_4 = 6$

$x_1 - x_2 + x_3 + 5x_4 = 4$

QUE.5 (B) Explain the Steepest descent method and its Convergence Criteria. 5

OR

QUE.5 (A) Write the Procedure of revised simplex method to solve a general linear Programming problem. 7

(B) Explain Newton's method and its working procedure, advantages and disadvantages. 4

QUE.6 (A) Write down the characteristics of standard form of LPP and the Procedure to transform a general form of a LPP to its standard form. 6

(B) Solve the following LPP Using two Phase method 6

Minimize $Z = 2x_1 + 3x_2 - x_4 + x_5$

subject to the $3x_1 - 3x_2 + 4x_3 + 2x_4 - x_5 = 0$

$x_1 + x_2 + x_3 + 3x_4 + x_5 = 2$

$x_i \geq 0, i = 1 \text{ to } 5$

END OF PAPER