(DME 416 C)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Final Year)

MECHANICAL ENGINEERING

Paper - VI : Optimization Techniques

Time : 3 Hours   **Maximum Marks : 75**

Answer question No. 1 compulsory   *(15)*

Answer ONE question from each unit   *(4 x 15 = 60)*

1)   Write a brief note on :

   a)   Interpolation methods.

   b)   Define Hessian matrix of a function.

   c)   State limitations of classical methods insolving one-dimensional minimization problem.

   d)   Define a saddle point and indicate its significance.

   e)   Geometric programming.

Unit - I

2)   a)   State the linear programming problem in stand form and explain.

   b)   List the engineering application of optimization.

OR

3)   Write detailed notes on classification of optimization problems.

Unit – II

4)   Explain Random search method with an example.

OR

5)   a)   Explain any gradient search method using a flow chart.

   b)   Find the extreme points of the function.

   $$f(x) = x_1^3 + x_2^3 + 2x_1^2 + 4x_2^2 + 6$$

Unit – III

6) Find the solution for the following problem using geometric programming method

Minimize $Z = x_1 x_2 x_3^{-2} + 2 x_1^{-1} x_2^{-1} x_3 + 5x_2 + 3x_1 x^{-2}$

$x_1, x_2, x_3 \geq 0$

OR

7) Explain with an example stochastic programming. Give some application areas of stochastic programming.

Unit – IV

8) a) Explain method of optimization used in design of simple linkage mechanism.

b) Derive the necessary conditions of optimality and find the solution for following problem.
Min $f(x) = 5x_1 x_2$
Subjected to $25 - x_1^2 - x_2^2 > 0$.

OR

9) A closed cylindrical storage tank is required to hold a minimum of 3000 m^3 of oil. Cost of material is Rs. 50/- per square meter. Frame a constrained geometric programming problem for minimum cost and solve.

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