GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER III (OLD) - EXAMINATION - WINTER-2016

Subject Code: 730801

Subject Name: Engineering Optimization

Time:02:30 pm to 05:00 pm

Instructions:

0.4

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- 0.1 (a) Show the mathematical formulation of an optimization problem and describe 07 design vector, design constraints, and objective function with suitable example. 07
 - Give the classification of Optimization problems. **(b)**
- State and prove Necessary and sufficient conditions for Unconstrained single **Q.2** (a) 07 variable problems
 - Find the extreme points of function: **(b)**

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

OR

- (b) Describe how a method of langrage multiplier can solve Unconstrained 07 multivariable optimization problem with inequality constraints.
- Explain Kuhn-Tucker theorem with necessary and sufficient Conditions in **Q.3** 07 (a) Classical Optimization Techniques.
 - Minimization of function **(b)**

$$f(X) = 0.65 - \frac{0.75}{(1+x^2)} - 0.65 \tan^{-1}(1/x)$$

Using Golden section method with n=6

OR

- Q.3 What is the basic approach for penalty function method with equality 07 (a) constrained?
 - Describe the algorithms for Zoutendijk's method of feasible directions. 07 **(b)**
 - Define and describe Optimization as a part of Mechanical Design. 07 **(a)**
 - What is Convergence? Differentiate between linear and super-linear **(b)** 07 convergence.

OR

- Describe exterior penalty function method. **0.4** (a)
- Prove the Convergence criterion for Interior penalty function method. 0.4 **(b)**
- Q.5 What is the procedure to follow for solving optimization problems using **(a)** 07 Genetic Algorithms?
 - Enlist MATLAB Functions and explain any TWO for Solving Optimization **(b)** 07 Problems in MATLAB Optimization Toolbox.

OR

- Discuss solution of an unconstrained geometric programming problem using 07 Q.5 (a) differential calculus.
 - Compare Genetics Algorithm and Simulated Annealing methods of 07 **(b)** optimization.

- Date:25/10/2016
- **Total Marks: 70**

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