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| Image result for nit meghalaya logo | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | | **CURRICULUM** | | | |
| Programme | | | **Master of Technology** | | | | | Year of Regulation | | | | | | **2018-19** | | | |
| Department | | | **Civil Engineering** | | | | | Semester | | | | | | **II** | | | |
| Course  Code | | Course Name | | Pre requisites | | Credit Structure | | | | | Marks Distribution | | | | | | |
| L | T | | P | C | INT | | MID | | END | | Total |
| **CE572** | | **Optimization Methods** | | **None** | | **3** | **0** | | **0** | **3** | **50** | | **50** | | **100** | | **100** |
| Course  Objectives | | 1. To develop the student’s knowledge on basics of optimization process. 2. To provide some knowledge about various optimization methods for single and multivariable unconstrained and constrained problems. 3. To develop understanding of linear programing problems. 4. To make the student understand about genetic algorithm concepts. | | | Course Outcomes | | CO1 | | Student will be able to understand the basics of optimization process. | | | | | | | | |
| CO2 | | Student will demonstrate the ability to perform analysis of single and multivariable unconstrained problems. | | | | | | | | |
| CO3 | | Student will be able to understand the concept of nonlinear constrained optimization techniques. | | | | | | | | |
| CO4 | | Student will be able to solve linear programming problems. | | | | | | | | |
| CO5 | | Student will be able to understand the concept genetic algorithm. | | | | | | | | |
| SYLLABUS | | | | | | | | | | | | | | | | | |
| **No.** | **Content** | | | | | | | | | | | **Hours** | | | | **COs** | |
| I | **Introduction**  Optimization problem formulation, types of optimization problems, objective function, design variables, constraints and variable bounds. | | | | | | | | | | | 02 | | | | CO1 | |
| II | **Single variable optimization methods**  Optimality criteria, necessary and sufficient conditions, bracketing methods, region elimination methods, gradient based methods. | | | | | | | | | | | 06 | | | | CO2 | |
| III | **Multivariable optimization methods**  Optimality criteria, necessary and sufficient conditions, unidirectional search, direct search methods, gradient based methods. | | | | | | | | | | | 07 | | | | CO2 | |
| IV | **Constrained optimization methods**  Direct substitution techniques, transformation methods, Lagrange multipliers methods, Kuhn-Tucker conditions. | | | | | | | | | | | 07 | | | | CO2, CO3 | |
| V | **Linear programming problem**  Graphical methods, simplex method, big M method, applications of linear programming problems. | | | | | | | | | | | 07 | | | | CO4 | |
| VI | **Genetic algorithms**  Introduction to genetic algorithms, working principles of genetic algorithms, encoding of variables, selection, cross over and mutation, applications. | | | | | | | | | | | 07 | | | | CO5 | |
| **Total Hours** | | | | | | | | | | | | **36** | | | |  | |
| **Essential Readings** | | | | | | | | | | | | | | | | | |
| 1. K. Deb, “Optimization for Engineering Design”, PHI Learning, 2nd Edition, 2014. | | | | | | | | | | | | | | | | | |
| 1. S. S. Rao, “Engineering Optimization Theory and Practice”, John Wiley and Sons, 4th Edition, 2009. | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | |
| 1. J. S. Arora, “Introduction to Optimum Design”, McGraw Hill Education, 4th Edition, 2017. | | | | | | | | | | | | | | | | | |
| 1. E. K. P. Chong and S. H. Zak, “An Introduction to Optimization”, John Wiley and Sons, 4th Edition, 2013. | | | | | | | | | | | | | | | | | |