BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

INSTRUCTION DIVISION

SECOND SEMESTER 2015-2016

Course Handout Part II

Date: 13.01.2016

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **MATH F471**

Course Title : NONLINEAR OPTIMIZITION

Instructor-in-charge : C B GUPTA

1. **Scopes and Objective of the Course:**

The objective of this course is to provide a comprehensive and rigorous account of theory of nonlinear programming. In addition to the classical topics, other methods such as Lagrange multiplier theory, duality and interior point method are also discussed in this course. Convex analysis approach is used to explain the concept of optimization. Algorithms for Quadratic Programming, Separable Programming, Linear Fractional Programming are also explained.

2. Text Book:

1. M. S. Bazzara, C.M. Shetty, Nonlinear Programming: Theory and Algorithms, Wiley-Interscience; 1st edition, 1979.

3. Reference:

1. C. B. Gupta. Optimization Techniques in Operations Research, Second edition,2012

2. Hamdy A Taha, Operations Research: An Introduction, Pearson Education, Ninth edition 2011.

3.Dimitri P. Bertsekas, Nonlinear Programming, Athena Scientific, Belmont, Massachusetts, Second edition, 1999.

4. O.L. Mangasarian, Nonlinear Programming, SIAM Publishing, 1994.

Learning Objectives	Topics to be Covered	Lecture Nos.	References
Model Construction	Problem Statement, Basic definition, guideline for model construction.	1-2	Chapter 1 Section 1.1-1.2

Convex Set	Convex Sets, Convex Hulls, properties of convex sets, Convex Cones and polarity,	3-8	Chapter 2 Section 2.1-2.6
Convex Functions	Definition and properties, subgradients of Convex functions, Differentiable convex functions, Maxima and Minima, Generalization of convex functions	9-14	Chapter 3 Section 3.1-3.5
Optimality Conditions	Kuhn Tucker optimality conditions for Unconstrained problems, Inequality and Equality Constrained problem	15- 20	Chapter 4 Section 4.1-4.3.
Constraint Qualifications	Cone of tangents, other constraint qualifications	21-24	Chapter 5 Section 5.1-5.3.
Duality	Lagrangian Dual Problem, Duality Theorems and saddle point optimality conditions, Properties of the Dual Function, Solution of dual and primal	25-30	Chapter 6 Section 6.1-6.5.
Unconstrained Optimization	Line search with and without using Derivatives, Multidimensional Search with and without using Derivatives	31-35	Chapter 8 Section 8.1-8.5.
Constrained Optimization	Quadratic Programming, Separable Programming, Linear Fractional Programming	36-40	Chapter 11 Section 11.1-11.4.

5. Evaluation Scheme:

Component	Duration	Marks	Weightage (%)	Date & Time	Remarks
Mid Semester	90 minutes	70	35	16/3 2:00 -3:30 PM	CB
Tutorial Test	15 minutes	40	20	Un announced quiz-3 of 20 marks each(Best 2 will be considered)	CB
Comprehensive	180 minutes	90	45	9/5 FN	Partially OB

6. Make-Up Policy: Only genuine cases will be entertained (Prior permission will be needed for makeup)

7. **Chamber Consultation Hours:** To be announced in the class.
8. **Notice:** Notices concerning this course will be displayed on Mathematics Notice Board/ Nalanda.

INSTRUCTOR-IN-CHARGE