BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

INSTRUCTION DIVISION

FIRST SEMESTER 2016-2017

Course Handout (Part II)

Date: 3/8/2016

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 F214
Course Title : Elementary Real Analysis
Instructor-in-charge : RAJIV KUMAR

1. Scope and objective of the Course :

The objective of this course is to train the students with the basic tools of Modern Mathematical analysis ,train them in art of logical, deductive & constructive thinking and thus equip them with enough back ground for courses which involve deeper Mathematical analysis . Real analysis is needed in several science & enginnering disciplines, in study of dynamical systems, which are solutions of differential equations, theoretical study of differential equations, concept of fractal & fractal dimension is usually studied in metric spaces. Riemann integral is basic integral on which advance theory of integration is developed. Integration theory is needed in study of theoretical & numerical study of solution of partial differential equations.

2. Course Description : Countable and uncountable sets; real numbers, metric spaces, continuous and uniformly continuous maps in metric spaces, connectedness, completeness and compactness in a metric space, Numerical sequences and series , Riemann integration & Riemann Stieltjes Integral, Convergence & uniform convergence of sequence of functions, Approximation of continuous function, functions of several variables, derivative of function of several variables , inverse function theorem.

3. Text Book :

W. Rudin, Principles of Mathematical Analysis, McGraw, Hill 3rd edition, 1983.

4. Reference Books :

1. Apostal: Mathematical Analysis , Addision Wesley,1983
2. Real Analysis John M Howie Springer Verlag 2000
3. Kenneth Ross : Elementary Analysis , Springer international edition 2000

5. Course Plan :

Lecture n.	Learners objective	Subject matter	Ref.
1-2	Representation of real numbers	Decimal & ternary representation of real numbers , rational & irrational numbers & their decimal representation	Ross Chapter I Chapter 2
3-6	Sequences & subsets of real numbers	Construction of real numbers Sup & inf of subsets of real numbers lim sup & liminf of sequences ,monotone sequences	Chapter 2 Rudin Chapter 2 Ross

7-8	Difference between countable & uncountable set	Elementary set theory & logic, Countable & uncountable sets	1st Chapter Rudin
9-15	Generalization of concept of distance to abstract sets	Metric spaces, compact sets, different Definition of compact sets, Cantor Intersection theorem, Contraction Principle	Chapter 2 Rudin
16-20	Generalization of concept of continuity & limit to metric spaces	Continuous & uniformly continuous functions& their properties	Chapter 4 Rudin Chapter 3 Ross
21-23	How Riemann integral can be Written as limit of sum	Elementary Riemann Integral & its properties	Chapter VI Rudin Chapter VI Ross
24-28	Integration with respect to a function	Riemann Stieltjes integral & properties	Chap. 7 of Ref.1
29-33	Distinguish between uniform & point wise convergence of sequence of functions. Functions not differentiable but continuous	Point & uniform convergence of functions & related properties of integrability & differentiability	Chapter 7 Rudin Chapter IV Ross
34-36	How bad functions can be approximated	Some approximation theorems of cont. functions	Chapter 7 Rudin
37-40	How continuity & differentiability have generalization for function of several variables	Functions of several variables, Inverse function theorem	Rudin

6. **Evaluation Scheme:**

Components	**Durations**	**Weightage**	**Date & Time**	**Comment**
Test	90 min	30%		Closed Book
Quiz		**30%**		**Open/Closed**
Comprehensive Exam	3 hrs.	40%		Closed Book

7. Chamber consultation hour: To be announced in class.

8. Notices : If any concerning this course will be displayed on the Notice Board of the Math Department , normally information will be conveyed in the class.

9. **Extra Problems :** Regular Problem sets will be given for the type of problems to be done.

10. **Make up :** Prior permission is needed for makeup, makeup may be given if enough evidence is there for not being able to take regular test. Make up for Quiz is not permitted

INSTRUCTOR-IN-CHARGE
MATH F214