Birla Institute of Technology & Science, Pilani
Hyderabad Campus

INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout Part-II

01-08-2016

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

Course No. :	MATH F111
Course Title:	MATHEMATICS I
Instructor-in-charge:	A. Michael Alphonse
Name of Instructors:	Anil Nemili, B. Mishra, D. K. Satpathi, K. Venkata Ratnam, Kishore Kumar, Manish Kumar, Sharan Gopal, Sumit Kumar V.

Scope and Objective of the Course:

Calculus is needed in every branch of science and engineering, as all dynamics is modeled through differential and integral equations. Functions of several variables appear more frequently in Science than functions of a single variable. Their derivatives are more interesting because of the different ways in which the variables can interact. Their integrals occur in several areas such as probability, fluid dynamics, electricity, just to name a few. All these lead in a natural way to functions of several variables. Mathematics of these functions is one of the finest achievements of modern Mathematics.

Text Book:

1. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas' Calculus*, Pearson, 11th Edition, 2007.

Reference Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th Edition, Wiley-India, 2007.
2. James Stewart, *Calculus*, 5th Edition, Cengage Learning, 2003.
3. Monty J. Strauss, Gerald L. Bradley and Karl J. Smith, *Calculus*, 3rd Edition, Pearson, 2007.

Course Plan:

Lect. No.	Learning Objectives	Topics to be Covered	Reference to Textbook: Chap / Sec
1-3	How calculus of one variable real-valued functions are related with those definitions of vector valued functions?	Limit, continuity and differentiability of vector functions, arc length, velocity and unit tangent vector	13.1, 13.3
4-7	Appreciate the concepts of curvature and torsion.	Curvature, normal vector, torsion and binormal vector, tangential and normal components of velocity and acceleration	13.4, 13.5
8-9	How to prove continuity, discontinuity and existence of limits for the functions of several variables?	Functions of several variables, level curves, limits, continuity	14.1, 14.2

10-12	Difference between derivatives partial derivatives	Partial derivatives, chain rule	14.3, 14.4
13-14	Distinguish between all types of derivatives	Directional derivative, gradient vectors, tangent planes and normal line	14.5, 14.6
15-16	Mathematical definition of a local Maximum and Minimum.	Maximum, minimum and saddle points of functions of two or three variables, constrained maxima and minima – method of Lagrange multipliers.	14.7, 14.8
17-19	How to obtain length of a polar curve and area of a surface of revolution of a polar curve?	Length of a polar curve, area of a surface of revolution.	10.5 &10.6 (self-study), 10.7
20-21	How formula for area in polar coordinates can be found through polar double integral?	Double integrals, area, change of integrals to polar coordinates.	15.1, 15.3
22-26	Try to identify which type of Integral evaluates volume of a solid in simplest way	Triple integral, integral in Cylindrical and Spherical coordinates	15.4, 15.6, 15.7
27-30	Learn equivalent definitions of conservative field. How Green's theorem can simplify evaluation of line integrals?	Line integral, work, circulation, flux, path independence, potential function, conservative fields, Green's theorem in the plane	16.1, 16.2, 16.3, 16.4
31-34	Is Stokes' theorem analogue of Green's theorem in plane?	Surface area and surface integral, Gauss divergence theorem, Stokes' theorem.	16.5,16.7,16.8
35-38	Study of convergence of infinite series with examples & counter examples	Sequence of real numbers, frequently occurring limits, infinite series different tests of convergence, series of nonnegative terms, absolute and conditional convergence, alternating series	11.2-11.6
39-41	Approximating complicated functions by polynomials	Power series, Taylor and Maclaurin series	11.7, 11.8

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage	Date, Time	Nature of Component
1.	Test I	1 Hr	30%	8/9, 10.00--11 AM	Closed Book
2.	Test II	1 Hr	30%	25/10, 10.00--11 AM	Open Book
3.	Comprehensive Examination	3 hrs	40%	02/12 FN	Closed Book

Chamber consultation hour: To be announced in the class.

Make-up Policy:
Make-up will be given only for very genuine cases and prior permission has to be obtained from I/C.

Notices: The notices concerning this course will be displayed on the CMS Notice Board only.

INSTRUCTOR –IN -CHARGE