BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
K K BIRLA GOA CAMPUS
FIRST SEMESTER 2017-2018
Course Handout (Part II)

Date: 01/08/2017

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 : PRASANNA KUMAR
Instructors : *T. Singh, Amit Setia, Himadri Mukherjee, Pradeep B , Shilpa G, Akshay Rane, Santosh B, Pabitra Kumar*

1. **Course Description:** The course is intended as a basic course in calculus of several variables and vector analysis. It includes polar coordinates, convergence of sequences and series, partial derivatives, vector calculus with theorems due to Green, Gauss and Stokes.

2. **Scope and Objective of the Course:** Calculus is needed in every branch of science & engineering, as all dynamics in modeled thought are differential & integral equations. Functions of several variables appear more frequently in science than functions of single variable. Their derivatives are more interesting because of the different ways in which the variables can interact. Their integrals occur in several places as probability, fluid dynamics and electricity, just to name a few. All lead in a natural way to functions of several variables. The objective is to understand the geometrical perspectives of two and three dimensions with the knowledge of differentiation and integration.

Text Book:

Thomas' Calculus by Maurice D.Weir, Joel Hass, *Pearson education 12th edition,* 2015/2016.

Reference Books:

R1: Essential Calculus Early Transcendentals by J. Stewart, *Thomson Learning,* 2014.
R2: A First Course in Calculus by Searge Lang, *Springer-Verlag 5th Edition*, 2009.
R3: Advanced Engineering Mathematics by Erwin Kreyszig *Wiley 10h edition,* 2015.
R4: Calculus Vol 1& 2, by T M Apostol, 2nd edition, 2007.
R5: Basic Multivariable Calculus by Jerrold E. Marsden, Anthony Tromba, Alan Weinstein, 3rd edition, 1993.

Lec. No.	Learning Objectives	Topics to be covered	Chap/Sec.	Exercise Problems
1-6	To study convergence of infinite series	Sequence of real numbers, frequently occurring limits, infinite series, different tests of convergence, series of non negative terms, absolute & conditional convergence alternating series	10.1-10.6	10.1; 27-90, 10.2: 1-14, 27-40,49-68, 69-78, 83-88 10.3: 1-40 10.4: 1-58, 10.5: 1-44, 55-60 10.6: 1-48
7, 8	To study the series	Power series, Maclaurin's	10.7, 10.8	10.7: 1-48

	representation of differentiable functions	series, Taylor series of functions		10.8: 1-36
9-12	To study curves in polar form	Polar -coordinates, graphing, polar equations of conic sections, integration	11.3-11.5, 11.7	11.3:1-68 11.4: 1-33 11.5:1-28 11.7:1-36
13-15	To study the basic calculus of vector-valued functions	Limit, continuity & differentiability of vector function, arc length, unit tangent vector	13.1-13.3	13.1:1-27 13.2: 1-18 13.3: 1-15
16-19	To study the quantities that describe how an object's path can turn and twist in space	Curvature, Normal vector, tangential and normal components of velocity and acceleration.	13.4,13.5	13.4: 1-6,9-19 13.5: 1-19, 22-26
20,21	To study limits and continuity in higher dimensions	Functions of several variables, level curves, limits, continuity	14.1,14.2	14.1: 17-30, 49-52, 61-68 14.2: 1-68
22-24	To study the concept of partial differentiation and its physical / geometrical interpretation	Partial derivatives, chain rule, directional derivative, gradient vectors,	14.3-14.5	14.3: 1 -56, 65-66, 73-80 14.4: 1-38, 43-44, 14.5:1-35
25-26	To estimate the value of a function through linearization	Tangent planes & normal line, linearization	14.6	14.6: 1-22,25-30, 33-48
27 -29	To study the concept of extreme values on functions of several variables	Maxima, minima & saddle points of functions of two or three variables, Lagrange multipliers	14.7,14.8	14.7:1-42, 50-59 14.8: 1-14, 17-30, 33-40
30-32	To study double integrals in cartesian and polar form	Double Integrals, area, change of integrals to polar coordinates	15.1- 15.4	15.1: 1-28 15.2: 1-66 15.3:1-22 15.4:1-36
33-35	To study three different types of volume integrals and applications	Triple integral, integral in cylindrical and spherical coordinates	15.5,15.7, 15.8	15.5: 1-44 15.7:1--62
36-39	To study the concept of integration over curves and surfaces in space	Line integral, work, flux, path independence, potential function, conservative field, Greens theorem in the plane	16.1-16.4	16.1: 1-32 16.2: 1-38, 47-54 16.3: 1-33 16.4: 1-1-34
40-42	To study higher dimensional versions of fundamental theorem of calculus	Surface area & surface integral, Divergence Theorem, Stoke's Theorem	16.5,-16.8	16.5: 17-26, 37-54 16.6: 1-42 16.7: 1-18 16.8: 1-20

6. **Evaluation Scheme:**

EC No.	Component	Duration	Weightage (%)	Nature
1	Mid-term Test	1 hour 30 mts	30	CB
2	Comprehensive exam	3 hours	45	CB
3	2 Home Assignments (HA) / 2 Announced Quizzes (AQ)	1st HA - 3days 2nd HA - 3 days AQ1 (before mid-term) - 30 mts AQ2 (after mid-term) - 30 mts	25 HA-5 each and AQ1-8 AQ2-7	OB

Make-up Policy: Make-up will be given only for very genuine cases (only in ECs 1 and 2) and prior permission has to be obtained from Instruction Division and I/C.

8. **Chamber consultation hour:** To be announced in the class.

9. **Notices:** All notices regarding the course **MATH F111** will be displayed on   online course platform; moodle.

Instructor-In-Charge
MATH F111