C.V. Raman Global University
Bhubaneswar - 752 054 (Odisha)

Department of Mathematics

Subject Name: Mathematics-I

Regulation Year: 2020-21

Course Code: MTH1001 **Credit: 3-1-0**

Course Category: Theory **Contact hours: 5**

Recommended Pre-requisite:

Elementary idea of sets, functions, trigonometry, two–dimensional co-ordinate geometry, fundamentals of differential and integral calculus of 10+2 standard.

COURSE OUTCOMES: After going through this course the student will be able to

CO1: determine asymptotes and curvature of a curve given in cartesian and polar form.

CO2: applying limit and examine continuity and differentiability of a function of more than one variable.

CO3: calculate the gradients, divergence, curl and directional derivatives of functions of several variables along with the physical interpretation.

CO4: analyzing the integral problems involving line, double, volume and surface integrals and beta gamma integrals and their applications in mechanics.

CO5: solving periodic functions as a (Fourier) series of sine and cosine functions, find Fourier transform and inverse Fourier transforms of some functions.

Course Details:

Unit 1 Differential Calculus: [10 hours]

Mean Value Theorems [Rolle's Theorem, Cauchy and Lagrange's Mean Value Theorems], Asymptotes [Cartesian and Polar forms], Curvature [Cartesian and Polar forms].

Unit 2 Functions of two and more Variables and Special Functions: [10 hours]

Functions of two or more several variables: limit, continuity and differentiability, homogenous functions and Euler's theorem, higher order partial derivatives and Taylor's series, maximum and minimum values, beta, gamma functions and error functions**.**

Unit 3 Vector Differential Calculus: 10 hours]

Derivatives of vector valued functions, vector equations of curves, tangents of a curve, gradient, directional derivative, divergence and curl, line and double integrals.

Unit 4 Vector Integral Calculus: **[10 hours]**

Green's theorem, Surface integrals, Volume integrals, Gauss Divergence theorem and Stokes theorem.

Unit 5 Fourier series and Fourier transforms: **[10 hours]**

Fourier series, Fourier expansion of functions of any period, even and odd functions, half range expansion, Fourier transform and Fourier integral.

Text Books:

T1. "Advanced Engineering Mathematics, Erwin Kreyszig, John Willy and Sons, 8th Edition, 1999.
Chapters: 8(8.4, 8.5, 8.9 – 8.11), 9(9.4 – 9.9), 10(10.1 – 10.4, 10.8 – 10.10).

T2. "Differential Calculus", Shanti Narayan and P.K. Mittal, S. Chand, 15th Edition, 2005.
Chapters: 8(8.1 – 8.5), 9(9.1-9.4, 9.6), 11(11.5, 11.6, 11.8, 11.11), 14(14.1 – 14.4), 15(15.1 – 15.5, 15.8).

T3. "Higher Engineering Mathematics", B.V. Ramana, The McGraw-Hill, 8th Edition, 2008.
Chapter: 11(11.1, 11.2).

Reference Books:

R1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.
R2. "Text Book of Differential Calculus", G. Prasad, Pothisala, 17th Edition, 2006.
R3. "Text Book of Integral Calculus", G. Prasad, Pothisala, 14th Edition, 2004.

Open Sources:

SWAYAM; COURSERA; ANY OTHER MOOC PLATFORM.

Course Designed by: Department of Mathematics

Course Approved by: Departmental Board of Studies (DBOS)