School of Engineering & Technology
Global Campus
Jakkasandra Post, Kanakapura Taluk, Ramanagara District - Pin Code: 562 112

# Mathematics-II
## Calculus, Laplace Transforms and Complex Variables
## (Common to all)
## Syllabus (2018 onwards)

| | | | |
|---|---|---|---|
| **Subject Code** | **: 18BS2MA01** | **Semester** | **: 2** |
| **Hours/week** | **: 4** | **Total Hours** | **: 45 + 15** |
| **Credits** | **: 4** | **L-T-P** | **: 3:1:0** |
| **IA** | **: 30** | **SEE** | **: 70** |

**Course Learning Objectives (CLO)**

The objective of this course is to make students

- Familiarize the prospective engineers with techniques in calculus, multivariate integration, Laplace transforms and differentiation and integration of complex variable
- To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

***Module 1: Multivariable Calculus (Integration): (10 lectures+3Tutorials)***

Multiple Integration: Double integrals, change of order of integration, Change of variables, Triple integrals, Applications: areas and volumes, orthogonal curvilinear coordinates

***Module 2: Vector Integration: (8 lectures+3Tutorials)***

Line integrals, surface integrals, volume integrals, Problems on Green, Gauss and Stokes theorem (without proof)

***Module 3: Laplace transforms and Inverse Laplace transform: (10 lectures+3Tutorials)***

Definition, Laplace transforms of elementary functions, properties of Laplace transforms (without proof).
Laplace transforms of periodic functions (without proof), Heaviside function and Dirac's Delta function.

Inverse Laplace transforms: Definition, transforms of standard functions and properties. Convolution theorem (without proof) and evaluation of inverse Laplace transforms using Convolution theorem. Solution of ordinary differential equations using Laplace transforms.

***Module 4: Complex Variable – Differentiation: (8 lectures+3Tutorials)***

Complex Differentiation, Cauchy-Riemann equations in Cartesian and Polar form, analytic functions, harmonic functions, construction of analytic functions and their properties.

Conformal mappings $f(z) = e^z,\ z^2$ & $z + \frac{k^2}{z}, z \neq 0$ , Bilinear/Mobius transformations and their

properties.

***Module 5: Complex Variable – Integration: (9 lectures+3Tutorials)***

Contour integrals, Cauchy theorem (without proof), Cauchy Integral formula (without proof), Taylor's series, Laurent's series.

Zeros of analytic functions, singularities, Residues, Cauchy Residue theorem (without proof),

**Assignment : Solution of the system of linear and non-linear differential equations and graphical analysis using MATLAB**

**NOTE : No questions will be asked from self-study and assignment section in the exam**

## TEXT BOOKS


1. B.S. Grewal; Higher Engineering Mathematics, Khanna Publishers, 41st Edition, 2011.
2. B V Ramana; Higher Engineering Mathematics, 10th Reprint Edition, 2010.


## REFERENCES


1. Dennis G Zill & Michael R Cullen; Advanced Engineering Mathematics, Second Edition; Jones & Barlett Publishers; 2000.
2. Erwin Kreyszig; Advanced Engineering Mathematics, 9th Edition, 2012.


## Course Outcomes:

At the end of the course students will be able to learn:

**CO1 :** Apply multiple integrals to find area, surface area and volume

**CO2 :** Evaluate line, surface and volume integrals of vector fields

**CO3 :** Apply Laplace Transforms to solve ordinary differential equations

**CO4 :** Understand the differentiation and integration of complex valued functions.