21MAT02	ADVANCED CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS (COMMON TO ALL BRANCHES)	L	T	P	C
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Course Objectives:

- **The course is designed to cover topics such as identify how engineering problems can be transformed into simple mathematical constructs and solve the same.**
- **To make the student acquire sound knowledge of techniques in solving Ordinary differential equations that model**
- **The various methods analysis and Laplace transform can be need for efficiently solving the problems that occur in various branches of engineering discipline.**

Course Outcomes:

After the completion of the course the student will be able to

- **Evaluate multiple integrals using change of variables.**
- **Apply Integration to compute multiple integrals area, volume ,Integrals in**

  Polar Coordinates in addition change of order and change of variables.
- **Apply techniques of Laplace Transform and inverse Laplace transform for problems in science and engineering.**
- **Demonstrate the understanding of solving ordinary differential equations using operator methods**
- **Apply complex analytic functions and its properties in solving problems.**
- **Apply complex integration using Cauchy Integral Theorem and their applications in evaluating integrals.**

UNIT 1	MULTIPLE INTEGRALS	12 Hours

Evaluation of double integrals - Change of order of integration - Change of variables from Cartesian and polar co-ordinates - Evaluation of triple integrals- Area using double integral, volume using Triple integral-Change of variables from Cartesian , cylindrical and spherical co-ordinates.

UNIT 2	ORDINARY DIFFERENTIAL EQUATIONS	12 Hours

Linear equations of second order with constant and variable coefficients-Homogeneous equation of Euler type-Equations reducible to homogeneous form-Variation of parameter-Simultaneous first order with constant co-efficient.

UNIT 3	LAPLACE TRANSFORMS	12 Hours

Laplace transforms of simple functions-Basic operational properties-Laplace Transforms of derivatives and integrals-Initial and final value theorems-Inverse transforms-Convolution theorem-periodic functions-Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

UNIT 4	ANALYTIC FUNCTIONS	12 Hours

Definition of Analytic Function-Cauchy Riemann equations-Properties of analytic functions- Determination of harmonic conjugate - Milne-Thomson's method Conformal mappings: 1/z, az, az+b , z^2 and bilinear transformation.

UNIT 5	COMPLEX INTEGRATION	12 Hours

Line integral-Cauchy's integral theorem (without proof)-Cauchy's integral formulae and-its applications-Taylor's and Laurent's expansions (statements only)-Singularities-Poles and Residue-Cauchy's residue theorem-Contour integration under unit circle and semi circular contour.

TEXT BOOKS:

1. B.S. Grewal . "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd edition ,2014.
2. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley & Sons. Singapore, 10th edition, 2012.
3. Veerajan. T, "Engineering Mathematics I", Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.

REFERENCE BOOKS:

1. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., "Advanced Mathematics for Engineering students", Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
2. Kandasamy P etal. "Engineering Mathematics", Vol. I (4th revised edition), S.Chand &Co., New Delhi, 2000.
3. Wylie, R.C and Barrett, L.C.,- "Advanced Engineering Mathematics" –Tata McGraw Hill education Pvt. Ltd 6th edition ,New Delhi-2012.

REFERENCE LINKS:

https://nptel.ac.in › courses
https://en.wikipedia.org