

MATHEMATICAL TRANSFORM TECHNIQUES

II Semester: AE / ME / CE / ECE / EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AHSC07	Foundation	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil		Total Classes: 60		
Prerequisite: Basic principles of calculus								
I. COURSE OVERVIEW:								
<p>This course focuses on transformations from theoretical based mathematical laws to its practical applications in the domain of various branches of engineering field. The course includes the transformations such as Laplace, Fourier, applications of scalar and vector field over surface, volume and multiple integrals. The course is designed to extract the mathematical developments, skills, from basic concepts to advance level of engineering problems to meet the technological challenges.</p>								
II. COURSE OBJECTIVES:								
The students will try to learn:								
<p>I. The transformation of ordinary differential equations in Laplace field and its applications. II. The operation of the non-periodic functions by Fourier transforms. III. The concepts of multiple integration for finding areas and volumes of physical quantities. IV. The Integration of the several functions by transforming the co-ordinate system in scalar and vector fields.</p>								
III. COURSE SYLLABUS								
MODULE-I: LAPLACE TRANSFORMS (09)								
<p>Definition of Laplace transform, linearity property, piecewise continuous function, existence of Laplace transform, function of exponential order, first and second shifting theorems, change of scale property, Laplace transforms of derivatives and integrals, multiplied by t, divided by t, Laplace transform of periodic functions. Inverse Laplace transform: Definition of Inverse Laplace transform, linearity property, first and second shifting theorems, change of scale property, multiplied by s, divided by s; Convolution theorem and applications to ordinary differential equations.</p>								
MODULE –II: FOURIER TRANSFORMS (09)								
<p>Fourier integral theorem, Fourier sine and cosine integrals; Fourier transforms; Fourier sine and cosine transform, properties, inverse transforms, finite Fourier transforms. .</p>								
MODULE –III: MULTIPLE INTEGRALS (09)								
<p>Double Integrals: Evaluation of double integrals in Cartesian coordinates and Polar coordinates; Change of order of integration; Area as a double integral; Transformation of coordinate system.</p> <p>Triple Integrals: Evaluation of triple integrals in Cartesian coordinates; volume of a region using triple integration.</p>								
MODULE –IV: VECTOR DIFFERENTIAL CALCULUS (09)								
<p>Scalar and vector point functions; Definitions of Gradient, divergent and curl with examples; Solenoidal and irrotational vector point functions; Scalar potential function. Line integral, surface integral and volume integral, Green’s theorem in a plane, Stoke’s theorem and Gauss divergence theorem without proofs.</p>								
MODULE –V: PARTIAL DIFFERENTIAL EQUATIONS (09)								
<p>Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations; Charpit’s method;</p>								

IV. TEXT BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 36th Edition, 2010.
2. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2008.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2010

V. REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9th Edition, 2006.
2. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
3. D. Poole, "Linear Algebra: A Modern Introduction", Brooks/Cole, 2nd Edition, 2005.
4. Dr. M Anita, "Engineering Mathematics-I", Everest Publishing House, Pune, First Edition, 2016.

VI. WEB REFERENCES:

1. http://www.efunda.com/math/math_home/math.cfm
2. <http://www.ocw.mit.edu/resources/#Mathematics>
3. <http://www.sosmath.com>
4. <http://www.mathworld.wolfram.com>.

VII. E-TEXT BOOKS:

1. <http://www.e-booksdirectory.com/details.php?ebook=10166>
2. <http://www.e-booksdirectory.com/details.php?ebook=7400re>