Syllabus

MA8251　　　ENGINEERING　MATHEMATICS – II　　　　　　　L T P C
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OBJECTIVES:
☐ To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
☐ To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
☐ To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
☐ To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT　I　　　MATRICES　　　　　　　　　　　　　　　　　9+3
Eigenvalues and Eigenvectors of a real matrix - Characteristic equation - Properties of eigenvalues and eigenvectors - Statement and applications of Cayley-Hamilton Theorem - Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation　　　　　　-　　　　　　Nature　　　　of　　　　quadraticforms.

UNIT II VECTOR CALCULUS
9+3
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields –Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem(excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT III ANALYTIC FUNCTIONS
9+3
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = z+k$, kz, $1/z$, z^2, e^z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION
9+3
　　Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

UNIT V LAPLACE TRANSFORM
9+3
Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform -Statement of Convolution theorem – Initial and final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.
TOTAL: 60 PERIODS
TEXT BOOKS:
1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd.,(2011).

2. Grewal. B.S, "Higher Engineering Mathematics", 41 st Edition, Khanna Publications, Delhi, (2011).

REFERENCES:

1. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., (2011)
2. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, (2012).
3. Peter V. O'Neil," Advanced Engineering Mathematics", 7th Edition, Cengage learning, (2012).
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, (2008).