FIRST SEMESTER BE SYLLABUS
(For the students admitted during academic year 2010-11)
Engineering Mathematics – 1
(First semester B.E course - Common to all branches)

Subject Code: **10MA1ICMAT**   CREDITS: **04**   L-T-P: **3 -1- 0**   Hours/Week: **3L+1T**

Unit-1

DIFFERENTIAL CALCULUS – 1:
Introduction to n^{th} derivatives of standard functions (self-study), Leibnitz's theorem (without proof). Rolle's theorem-geometrical interpretation, Lagrange's and Cauchy's mean value theorems (with proof). Taylor's and Maclaurin's series expansions for function of one variable.
(5L + 2T)

Polar curves: angle between radius vector and tangent, angle between the polar curves, length of the perpendicular from pole to the tangent, pedal equations of polar curves. Derivatives of arc length (cartesian and polar form). Radius of curvature - Cartesian, parametric, polar and pedal forms.
(4L + 1T)

Unit-2

DIFFERENTIAL CALCULUS -2:
Indeterminate forms – L'Hospital's rule (without proof)
(2L+1T)
Partial differentiation: Partial derivatives, total differentiation, differentiation of composite and implicit functions, Jacobians and their properties (without proof).
(4L+1T)
Taylor's and Maclaurin's series expansions for functions of two variables. Maxima and Minima for functions of two variables. Leibnitz rule for differentiation under the integral sign (without proof) - simple problems with constant limits. **Applications of Differential Calculus:** Errors and approximations.
(3L+1T)

Unit-3

INTEGRAL CALCULUS:

Reduction formulae for the integration of $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ (m and n being positive integers) and evaluation of these integrals with standard limits. Tracing of standard curves: Cartesian form-Cissoid, Strophoid, Lemniscate, Parametric form - Cycloid, Astroid, Polar form-Cardioid, Lemniscate.
(5L+1T)

APPLICATIONS OF INTEGRAL CALCULUS:
Area of a plane region, length of a plane curve, volume of revolution and surface area of revolution by a given curve (without proof and problems involving standard curves).
(2L+1T)

Unit-4

ORDINARY DIFFERENTIAL EQUATIONS – 1:
Solution of first order and first degree differential equations-variables separable (self-study), Homogeneous equations, equations reducible to homogeneous equations, linear equations, Bernoulli's equation, exact equations, equations reducible to exact equations (first four cases only).
(5L+1T)

APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER
Simple electric circuits (RL circuits), Newton's law of cooling, heat flux, rate of decay of radio-activematerials.
(2L+1T)

Unit-5

ORDINARY DIFFERENTIAL EQUATIONS – 2:
Linear differential equations of second and higher order with constant coefficients, method of variation of parameters, solutions of Cauchy's homogenous linear equation and Legendre's differential equation.   **(5L+2T)**

APPLICATIONS OF LINEAR DIFFERENTIAL EQUATIONS:
Simple harmonic motion, Simple Pendulum (small oscillations).   **(2L+1T)**

Text Books:

1. Higher Engineering Mathematics by B. S. Grewal, 40th Edn., Khanna Publishers
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edn,. John Wiley & Sons

Reference Books:
1. Advanced Modern Engineering Mathematics by Glyn James, 3rd edition, 2004, Pearson Education.
2. Higher Engineering Mathematics by B.V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill.
3. Advanced Engineering Mathematics by P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.

SEE Question Paper Pattern:

1. Candidate needs to answer one full question from each unit
2. Internal choice (either/or) will be there for questions in Unit-1 and Unit-2
3. No choice for questions in Units -3, 4 and 5.
4. Each full question shall cover the syllabus of the entire unit.

SECOND SEMESTER BE SYLLABUS
(For the students admitted during academic year 2010-11)
Engineering Mathematics – 2
(Common to all branches)

Subject Code: **10MA2ICMAT**   CREDITS: 04   L-T-P: **3 -1- 0**   Hours/Week: **3L+1T**

Unit-1

MATRICES:
Elementary row transformations, Echelon form of a matrix, rank of a matrix by elementary row transformations. Consistency of system of linear equations and solution. Solution of a system of non-homogenous equations: Gauss elimination method, Gauss-Seidel method, LU decomposition method. Characteristic values and Characteristic vectors of matrices, Cayley-Hamilton theorem (without proof). Computation of largest eigen value and eigen vector using Rayleigh's power method.
APPLICATIONS OF MATRICES
To compute the inverse of a 2x2 matrix using Cayley-Hamilton theorem, diagonalisation of matrices.   **(8L+2T)**

Unit-2
INTEGRAL CALCULUS:
Multiple Integrals – Double integrals, evaluation of double integrals by change of order of integration, evaluation of double integrals by changing to polar form, Triple integrals.
Applications of Double and Triple Integrals: Area and volume   **(5L+2T)**

INTRODUCTION TO ORTHOGONAL CURVILINEAR COORDINATES:
Definitions- Orthogonal curvilinear coordinates, scale factors, base vectors, orthogonality of cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates.   **(2L)**
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Unit-3

VECTOR CALCULUS:
Scalar and vector point functions, vector differentiation, Gradient, Divergence, Curl, Laplacian, solenoidal, irrotational vectors. Vector identities: $\mathrm{div}\left(\phi\vec{A}\right)$, $\mathrm{curl}\left(\phi\vec{A}\right)$, $\mathrm{curl}\left(\mathrm{grad}\phi\right)$, $\mathrm{div}\left(\mathrm{curl}\vec{A}\right)$,

$\mathrm{div}\left(\vec{A}\times\vec{B}\right)$ and $\mathrm{curl}\left(\mathrm{curl}\vec{A}\right)$.   **(5L+2T)**

Vector integration – Line integrals, surface integrals, Green's theorem, Stokes' theorem and Gauss divergence theorem (without proof, statement and problems).   **(4L+1T)**

Unit-4

LAPLACE TRANSFORMS:
Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals, properties, Periodic function, Unit step function and impulse function.   **(7L+3T)**

Unit-5

INVERSE LAPLACE TRANSFORMS:
Inverse Laplace Transforms-properties, Convolution theorem. **Applications of Laplace Transforms:** Solution of ordinary differential equations and simultaneous differential equations using Laplace transforms (initial and boundary value problems).   **(5L+2T)**

BETA AND GAMMA FUNCTIONS:
Properties, relation between Beta and Gamma functions, Duplication formula.   **(3L+1T)**

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1. Higher Engineering Mathematics by B. S. Grewal, 40th Edn., Khanna Publishers
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edn,. John Wiley & Sons
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