FIRST SEMESTER BE SYLLABUS
(For the students admitted during academic year 2009-10)

Engineering Mathematics – 1
(First semester B.E course - Common to all branches)

Subject Code: **09MA1ICMAT**   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 (without proof). Lagrange's and Cauchy's mean value theorems (with proof). Taylor's theorem for a function of a single variable and Maclaurin's expansions (without proof).
Polar curves and angle between the polar curves, Pedal equation for polar curves, derivatives of arc length, radius of curvature-cartesian, parametric, polar and pedal forms.   **[9 L + 3 T]**

Unit-2

DIFFERENTIAL CALCULUS – 2:
Indeterminate forms – L'Hospital's rule (without proof), Partial differentiation: Partial derivatives, Euler's theorem, total differentiation, differentiation of composite and implicit functions, Jacobians and their properties.
Taylor's theorem for function of two variables (without proof). Maxima and Minima for function of two variables, Lagrange's method of undetermined multipliers for extreme values (with one subsidiary condition). Errors and approximations.   **[10 L + 2 T]**

Unit-3

INTEGRAL CALCULUS:
Reduction formulae for the integration of $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$ 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, three leaved rose. Folium of Descartes.
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.   **[7 L + 2 T]**

Unit-4

INFINITE SERIES:
Convergence, divergence and oscillation of sequence and infinite series, comparison test, p-series, D'Alembert's ratio test, Raabe's test, Cauchy's root test, Cauchy's integral test for series of positive terms (all tests without proof). Alternating series, Leibnitz's test (without proof) Definition of absolute and conditional convergence-illustrative examples.   **[3 L + 2T]**

DIFFERENTIAL EQUATIONS – 1:
Solution of first order and first degree differential equations-variable separable (self study), Homogenous equations, equations reducible to homogenous equations, Linear equations, Bernoulli's equation, exact equations, equations reducible to exact equations (first four cases only).   **[4 L + 2 T]**

Unit-5

DIFFERENTIAL EQUATIONS -2:
Linear differential equations of second and higher order with constant coefficients, method of undetermined coefficients, method of variation of parameters, solutions of Cauchy's homogenous linear equation and Legendre's equation, solution of initial and boundary value problems.

[6 L + 2 T]

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 Book:

1. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill Publishing Company 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.

Engineering Mathematics – 2
(Common to all branches)

Subject Code: **09MA2ICMAT**   **CREDITS: 04**   **L-T-P: 3 -1- 0**   Hours/Week: **3L+1T**

Unit-1

ANALYTICAL GEOMETRY IN THREE DIMENSIONS:
Direction cosines and direction ratios, Planes, Straight lines, angle between planes / straight lines, coaxial planes, coplanar lines, shortest distance between two skew lines, right circular cylinder, right circular cone, equations of a sphere.   **[9 L + 2T]**

Unit-2

VECTOR CALCULUS:
Vector differentiation: Velocity and acceleration (self-study), Gradient, Divergence, Curl, Laplacian, solenoidal, irrotational vectors and their properties.
Vector integration: Line integrals, surface integrals, Green's, Stokes' and Gauss divergence theorems (without proof) and problems.   **[7 L + 2 T]**

Unit-3

ORTHOGONAL CURVILINEAR COORDINATES:
Cylindrical and spherical coordinates, Gradient, Divergence, Curl, and Laplacian in Orthogonal Curvilinear Coordinates.   **[3 L + 1T]**

INTEGRAL CALCULUS:
Multiple Integrals – Double integrals, evaluation of double integrals by change of order of integration, change of variables, Evaluation of given Triple integrals, applications to area and volume.   **[6 L + 2 T]**

Unit-4

LAPLACE TRANSFORMS:
Definition, transforms of elementary functions, transforms of derivatives and integrals, properties, Periodic function, Unit step function and impulse function.   **[7 L + 2 T]**

Unit-5

INVERSE LAPLACE TRANSFORMS:
Inverse Laplace Transforms-properties, Convolution theorem, solutions of ordinary differential equations and simultaneous differential equations using Laplace transforms.   **[4 L + 2 T]**

BETA AND GAMMA FUNCTIONS:
Beta and Gamma Functions- Properties, relation between Beta and Gamma functions, Duplication formula.   **[3 L + 2 T]**

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. Higher Engineering Mathematics by B.V. Ramana, Tata McGraw-Hill Publishing Company Ltd.,
2. Advanced Modern Engineering Mathematics by Glyn James, 3rd Edition, Pearson Education

SEE Question Paper Pattern:

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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.