BMS COLLEGE OF ENGINEERING, BANGALORE – 560019
MATHEMATICS DEPARTMENT
SYLLABUS (2011 - 2012)
SECOND SEMESTER B.E COURSE - (Common to all branches)

Course Name	Engineering Mathematics -2	Course Code	11MA2ICMAT
Credits	04	L – T - P	3 -1- 0
Contact hours	52 hours (40L+12T)		

Objectives:
The objective is to provide students with a solid foundation in mathematical fundamentals such as Vectors, Orthogonal curvilinear coordinates, Matrices and Laplace Transforms required for solving engineering problems.

Course outcomes:
Knowledge of the course enables the student

i) To use the skills of vectors, curvilinear coordinates, for engineering problems.
ii) Apply Laplace Transform techniques to analyze and characterize linear circuits and solve ordinary differential equations.
iii) To have a good understanding on concepts of matrices that serves as an essential basis for several computational techniques.

UNIT-1

VECTOR CALCULUS [13 hours]

Scalar and vector point functions, vector differentiation (self-study), Gradient, Divergence, Curl, Laplacian, solenoidal, irrotational vectors. Vector identities: $\text{div}\left(\phi\vec{A}\right)$, $\text{curl}\left(\phi\vec{A}\right)$, $\text{curl}\left(\text{grad}\phi\right)$, $\text{div}\left(\text{curl}\vec{A}\right)$, $\text{div}\left(\vec{A}\times\vec{B}\right)$ and $\text{curl}\left(\text{curl}\vec{A}\right)$ **(6L+2T)**

ORTHOGONAL CURVILINEAR COORDINATES (OCC):

Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, orthogonality of cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates. Expressions for gradient, elementary arc length, divergence, elementary volume, curl and Laplacian in orthogonal curvilinear coordinates (without proof). **(4L+1T)**

UNIT-2

INTEGRAL CALCULUS [13 hours]

Multiple Integrals **–** Double integrals, evaluation of double integrals by change of order of integration, evaluation of double integrals by changing to polar form, computation of area using double integrals, Triple integrals, computation of volume using triple integrals. **(6L+2T)**

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

UNIT-3

MATRICES **[8 hours]**

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. **(6L+2T)**

UNIT-4

LAPLACE TRANSFORMS **[8 hours]**

Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals, properties, Periodic function, Unit step function and impulse function. **(6L+2T)**

UNIT-5

INVERSE LAPLACE TRANSFORMS **[10 hours]**

Inverse Laplace Transforms-properties, Convolution theorem. Solution of ordinary differential equations using Laplace transforms (initial and boundary value problems). **(5L+1T)**

BETA AND GAMMA FUNCTIONS

Beta & Gamma functions- Properties, relation between Beta & Gamma functions. **(3L+1T)**

Text Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th edition, 2007, Wiley-India.
2. Higher Engineering Mathematics, B.S. Grewal, 40th edition, 2007, Khanna Publishers.
3. Higher Engineering Mathematics, B. V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill

Reference Books:

1. Advanced Modern Engineering Mathematics, Glyn James 3rd edition, 2004, Pearson Education.
2. Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.

Question Paper Pattern:

1. Each unit consists of one full question.
2. Each full question consists of three or four subdivisions.
3. Five full questions to be answered.
4. Internal choice in Unit 1 and Unit 2