BMS COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous Institute, Affiliated to VTU
DEPARTMENT OF MATHEMATICS

Revised UG Syllabus for 2018-2019
I SEMESTER

Course Title	Engineering Mathematics -1	Course Code	18MA1BSEM1
Credits	04	L – T – P	3 – 1 – 0

Course Objectives: To acquaint the students with principles of mathematics through Calculus and Differential Equations, that serves as an essential tool in several engineering applications.

UNIT-1

DIFFERENTIAL CALCULUS – 1 **[09 hours]**

Polar curves - Angle between the radius vector and tangent, angle between two curves, length of the perpendicular from pole to the tangent, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Taylor's and Maclaurin's series expansions for function of one variable (without proof).

UNIT-2

DIFFERENTIAL CALCULUS – 2 **[10 hours]**

Partial differentiation; Total derivatives-differentiation of composite functions. Jacobians, Taylor's and Maclaurin's series expansions for function of two variables. Maxima and minima for a function of two variables.

UNIT-3

INTEGRAL CALCULUS **[11 hours]**

Multiple integrals: Evaluation of double integrals- change of order of integration and changing into polar co-ordinates, triple integrals. Applications: Area (Polar curves) and volume.

Beta and Gamma functions: Definitions, Relation between Beta and Gamma functions and problems.

UNIT-4

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER **[09 hours]**

Bernoulli's equation. Exact and reducible to exact differential equations.
$(i)\frac{M_y - N_x}{N} = g(x)$ $(ii)\frac{N_x - M_y}{M} = h(y)$. Initial value problems. Applications: Orthogonal trajectories and Mixing problems.

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UNIT-5

ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER [09 hours]

Second and higher order linear ordinary differential equations with constant coefficients-Inverse differential operators, Particular Integrals of e^{ax}, $\sin(ax), \cos(ax)$ and x^m. Method of variation of parameters; Cauchy's and Legendre homogeneous equations.

Bibliography

Text Books

1) Higher Engineering Mathematics, B.S. Grewal, 43rd edition, 2014, Khanna Publishers.
2) Higher Engineering Mathematics, B.V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill.

Reference Books

3) Advanced Engineering Mathematics, Erwin Kreyszig, edition 2014, Vol.1 and Vol.2, 2014, Wiley-India.
4) Advanced Engineering Mathematics, Dennis Zill, Warren S Wright, Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.

E-books and online course materials

5) Advanced Engineering Mathematics, P.V. O'Neil, 7th Indian reprint, 2011, Cengage learning India Pvt. Ltd.
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html
6) Engineering_Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001,
https://ndl.iitkgp.ac.in/ and
https://www.pdfdrive.com/engineering-mathematics-books.html

NPTEL/SWAYAM/MOOCs:

7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

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DEPARTMENT OF MATHEMATICS

On completion of the course, the student will have the ability to:

Course Code	CO	COURSE OUTCOME (CO)	PO	CO-PO Mapping (Strength)
	CO 1	Understand the concepts of Calculus and differential equations.	--	--
	CO 2	Apply the concepts of calculus and Differential Equations to Engineering Problems.	1	3
	CO 3	Demonstrate an understanding of the multiple integrals using alternate tools.	5	1

Question Paper Pattern

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1,4,5 and two questions each from Unit 2 and Unit 3.

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Revised UG Syllabus for 2018-2019
II SEMESTER

Course Title	Engineering Mathematics - 2	Course Code	18MA2BSEM2
Credits	04	L – T – P	3 – 1 – 0

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as Laplace Transforms, vectors and orthogonal curvilinear coordinates required for different branches of engineering.

UNIT-1

LAPLACE TRANSFORMS **[09 hours]**

Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals. Applications: Evaluation of Improper integrals using Laplace transforms, Laplace transform of Periodic functions and Unit step function.

UNIT-2

INVERSE LAPLACE TRANSFORMS **[10 hours]**

Inverse Laplace Transforms-properties, inverse transforms of standard functions, $L^{-1}\left[\frac{F(s)}{s}\right]$, $L^{-1}\left[e^{-as}F(s)\right]$, $L^{-1}\left[F^{(n)}(s)\right]$. Applications: Solution of differential Equations, LRC series circuits and system of differential Equations.

UNIT-3

PARTIAL DIFFERENTIAL EQUATIONS **[10 hours]**

Formation of partial differential equations by elimination of arbitrary constants and functions. Solution of non-homogeneous partial differential equations by direct integration. Solution of Lagrange's linear partial differential equations. Solution of partial differential equations by the method of separation of variables, Derivation of one dimensional heat and wave equations and various possible solutions by the method of separation of variables.

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UNIT-4

VECTOR CALCULUS **[10 hours]**

Scalar and vector point functions, Gradient, directional derivative, Divergence, Curl, Laplacian of a vector point function, solenoidal, irrotational vectors. Vector identities: divcurl $\vec{A}$, curlgrad ϕ, div $\left(\phi\vec{A}\right)$, curl$\left(\phi\vec{A}\right)$, div$\left(\vec{A}\times\vec{B}\right)$, curlcurl $\vec{A}$ and problems on vector identities.

Vector integration: Statement and problems on Green's theorem, Stokes' theorem and Gauss divergence theorem (without proofs).

UNIT-5

ORTHOGONAL CURVILINEAR COORDINATES (OCC): **[09 hours]**

Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates. Expressions for gradient, divergence, curl and Laplacian in orthogonal curvilinear coordinates.

Bibliography

Text Books

1) Higher Engineering Mathematics, B.S. Grewal, 43rd edition, 2014, Khanna Publishers.
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https://ndl.iitkgp.ac.in/ and
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6) Engineering_Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001,
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NPTEL/SWAYAM/MOOCs:

7) http://nptel.ac.in/courses.php/
8) https://www.class-central.com/subject/math (MOOCS)

On completion of the course, the student will have the ability to:

COURSE CODE	CO	COURSE OUTCOME (CO)	PO	CO-PO Mapping (Strength)
	CO 1	Understand the concepts of transforms, partial differential equations and vector calculus.	--	--
	CO 2	Apply the concepts of transforms, partial differential equations and calculus to Engineering problems.	1	3
	CO 3	Demonstrate an understanding of the Laplace transforms of functions using alternate tools.	5	1

Question Paper Pattern:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from units 1,3,5 and two questions each from Unit 2 and Unit 4.

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