

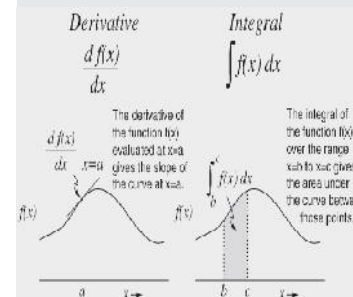
19HS101 ENGINEERING MATHEMATICS - I (A)

Hours Per Week :

L	T	P	C
2	0	2	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
30	0	30	10	45	-	-	-	-



SOURCE :
<http://hyperphysics.phy-astr.gsu.edu/hbase/Math/immath/derint.gif>

COURSE DESCRIPTION AND OBJECTIVES:

Differential equations are very useful when several of the factors of a problem are known and several unknowns. Calculus is used to determine the rates of change or rates by which factors, such as acceleration or weight, change. To impart analytical ability in solving mathematical problems as applied to the respective branches of engineering.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the complementary functions and particular integral of second and higher order ordinary differential equations with constant coefficients.	---
2	Apply the knowledge of ordinary differential equations in some instances.	1
3	Analyse ordinary differential equations, with initial conditions, numerically.	3
4	Evaluate the local maxima/minima of given function of two variables.	4
5	Apply eliminate arbitrary constants/functions from given relations to form partial differential equations.	3
6	Solve linear and non-linear partial differential equations of creative standard types and classify second order partial differential equations and solve them.	9,11

SKILLS:

- ✓ Solve given differential equation by suitable method.
- ✓ Compute numerical solutions of differential equation by appropriate method.
- ✓ Compute maxima/minima of given function.
- ✓ Solve given partial differential equation by appropriate method.

UNIT - I **L-06**

Matrices: Elementary transformations, rank of a matrix, nature of rank, reduction to normal form, Echelon form, Gauss-Jordan method to find inverse of a matrix, PAQ form, Solution of linear equations.

UNIT - II **L-06**

Eigen values and Eigen vectors: Eigen values and Eigen vectors, Cayley-Hamilton theorem, using Cayley-Hamilton theorem to find inverse of A, linear transformation, orthogonal transformations, diagonalisation of matrices and quadratic forms.

UNIT - III **L-06**

Differential calculus: Function of two or more independent variables, partial differentiation, homogeneous functions and Euler's theorem, total derivatives, maxima and minima of functions of two variables.

UNIT - IV **L-6**

Integral calculus: Double and triple integrals, change of order of integration, application of double and triple integrals to find area and volume.

UNIT - V **L-06**

Vector calculus: Differentiation of vectors, scalar and vector point functions, vector differential operator Del, Gradient of a scalar point function, Divergence and Curl of a vector point function and their physical interpretations, line, surface and volume integrals, Stoke's, divergence and Green's theorems (without proofs).

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS****TOTAL HOURS-30**

1. Rank of a matrix.
2. Reduction to normal form.
3. Consistency and solution of linear equations.
4. Eigen values and eigen vectors.
5. Cayley-Hamilton theorem.
6. Diagonalization of matrices.
7. Vector algebra.
8. Gradient.
9. Divergence.
10. Curl of a vector Point Function.
11. Green's theorem.
12. Stokes theorem for surface integral.
13. Volume integral, Gauss divergence theorem.
14. Surface integral.
15. Function of two or more variable, partial differentiation, homogeneous, function Euler's theorem, composite function.
16. Practical examinations.

TEXT BOOKS:

1. H. K. Dass and Er. Rajanish Verma, 2015, "Higher Engineering Mathematics", S. Chand & Co., Third revised edition.
2. B. S. Grewal, 2018, "Higher Engineering Mathematics", Khanna Publishers, 44th edition.

REFERENCE BOOKS:

1. John Bird, 2018, "Higher Engineering Mathematics", Routledge (Taylor & Francis Group), London, New York.
2. Srimanta Pal, Subodh C. and Bhunia, 2015, "Engineering Mathematics", Oxford Publications.
3. B. V. Ramana, "Advanced Engineering Mathematics", TMH Publishers.
4. N. P. Bali and K. L. Sai Prasad, 2018, "A Textbook of Engineering Mathematics I, II, III," Universal Science Press, New Delhi.
5. T. K.V. Iyengar 2018, "Engineering Mathematics, I, II and III", S. Chand & Co., New Delhi.
6. Narayan Shanti. 2004, "Differential Calculus". S. Chand and Co. Ltd. New Delhi.