

16HS108 ENGINEERING MATHEMATICS - II

Hours Per Week :

L	T	P	C
3	1	2	5

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	15	30	10	45	-	-	-	-

Course Description and Objectives:

It is aimed to offer different methods for finding rank of a matrix, solving linear equations using matrices, to compute Eigen values and Eigen vectors, to verify C.H.T and apply it to find power of a matrix. Also, to make the students familiarize with double and triple integrals, to make the student acquainted with the concepts of vector differentiation and integration. To make the student to use different mathematical tools of MATLAB related to above concepts.

Course Outcomes:

The student will be able to:

- carry out the basic operations of matrix algebra.
- use row operations to reduce a matrix to echelon form, normal form.
- determine consistency of a system linear equations.
- compute eigen values and eigen vectors.
- evaluate double integrals and triple integrals.
- evaluate double integrals in polar coordinates.
- utilize Cartesian and polar coordinates to find area.
- understand the concept of gradient, divergence and curl.
- apply vector integral theorems in finding surface and volume integrals.

SKILLS:

- ü Appreciate various methods to find the rank of a matrix.
- ü Solve given system of linear equations.
- ü Compute Eigen values and Eigen vectors of a matrix.
- ü Compute the power of a matrix by suitable method.
- ü Evaluate Multiple integrals.
- ü Evaluate surface and volume integrals through vector integral theorems.

UNIT - 1**L-9, T-3**

RANK OF MATRIX AND LINEAR EQUATIONS: Rank of a matrix, Normal form, Triangular form, Echelon form, Consistency of system of linear equations, Gauss-Jordan method, Gauss elimination method, Gauss-Siedal method.

UNIT - 2**L-9, T-3**

EIGEN VALUES AND EIGEN VECTORS: Eigen values, Eigen vectors, Properties (without proofs), Cayley-Hamilton theorem (without proof), Power of a matrix, Diagonalisation of a matrix.

UNIT - 3**L-9, T-3**

MULTIPLE INTEGRALS: Double integrals, Evaluation, Evaluation in polar coordinates, Change of order of integration, Change of variables, Applications to area in cartesian coordinates and polar coordinates, Triple integrals, Fundamentals, Evaluation of triple integrals.

UNIT - 4**L-9, T-3**

VECTOR DIFFERENTIATION: Vector function, Differentiation, Scalar and vector point function, Gradient, Normal, Divergence, Directional derivative, Curl, Vector identities.

UNIT - 5**L-9, T-3**

VECTOR INTEGRATION: Line integral, Surface integral, Volume integral, Green's theorem, Stoke's theorem, Gauss theorem of divsergence (without proofs).

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS**

Total hours-30

1. Matrix Algebra.
2. Rank of a matrix.
3. System of equations (Direct method).
4. System of equations (Cramer's Rule).
5. System of equations (matrix inversion method).
6. Eigen values and Eigen vectors of a matrix.
7. Powers of matrix & Cayley-Hamilton Theorem.
8. Vector algebra.
9. Gradient.
10. Divergence.
11. Curl.
12. Multiple Integrals (Area etc).
13. Interpolation.

TEXT BOOKS:

1. H. K. Dass and Rajanish Verma, "Higher Engineering Mathematics", 3rd edition, S. Chand & Co., 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th edition, 2014.
3. Rudra Pratap, "Getting started with Matlab", Oxford University Press, 2009.

REFERENCE BOOKS:

1. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", Oxford Publications, 2015.
2. B.V.Ramana, "Advanced Engineering Mathematics", 25th reprint, McGraw Hill Education, 2015.
3. R.K.Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", 2nd edition, Narosa Publishing House, 2007.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons (Asia) Pvt. Ltd., 2001.

ACTIVITIES:

- Differentiate the methods to find the rank of a matrix.
- Solve given system of linear equations and compare with MATLAB output.
- Compute Eigen values and Eigen vectors of a matrix and compare with MATLAB output.
- Compute the power of a matrix by suitable method.
- Evaluate multiple integrals and compare with MATLAB output.
- Evaluate surface and volume integrals through vector integral theorems.

