SMTA1101	ENGINEERING MATHEMATICS – I (COMMON TO ALL BRANCHES EXCEPT BIO GROUPS)	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- The Objective of this Course is to identify, reflect upon, evaluate and achieve conceptual understanding and knowledge of traditional Calculus to form independent judgments.
- The purpose of this course is for Modeling the Engineering problems and obtaining its solutions Mathematically.
- This helps in understanding Science, Engineering and Computer Science analytically and logical thinking is attained.

UNIT 1 MATRICES 9 Hrs.

Characteristic equation of a square matrix – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen Vectors – Cayley-Hamilton theorem (without proof) – verification, finding inverse and power of a matrix – Diagonalisation of a matrix using orthogonal transformation – Quadratic forms – Nature of quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT 2 GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS 9 Hrs.

Curvature – centre, radius and circle of curvature in Cartesian co-ordinates – Evolutes – Envelope of family of curves with one and two parameters – Evolute as envelope of normal.

UNIT 3 FUNCTIONS OF SEVERAL VARIABLES 9 Hrs.

Partial derivatives (Definition) – Total derivative – Jacobian – Taylor's expansion – Maxima and minima of functions of two variables – Constrained maxima and minima using Lagrange's multiplier method.

UNIT 4 INTEGRAL CALCULUS I 9 Hrs.

Definite integrals – Properties of definite integrals and problems – Beta and Gamma integrals – Relation between them – Properties of Beta and Gamma integrals with proofs – Evaluation of definite integrals in terms of Beta and Gamma function.

UNIT 5 INTEGRAL CALCULUS II 9 Hrs.

Double integrals in Cartesian and Polar co-ordinates – Change of order of integration – Change of variables from Cartesian to Polar coordinates – Area of plane curves using double integrals – Triple integrals – Volume using triple integrals in Cartesian co-ordinates (Simple Applications**).**

Max.45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Define Eigen values and Eigen vectors, radius and circle of curvature. Recall properties of definite integrals.
CO2 - Understand the concept of partial derivatives to find Jacobian and Taylor's series expansion. Explain change of order of integration.
CO3 - Uses of Cayley Hamilton theorem and its verification. Solve problems in Area and Volume using integration.
CO4 - Point out the stationary points and categorize maxima and minima. Discuss the problems involving Beta and Gamma integrals.
CO5 - Produce diagonal matrix by transformation of symmetric matrices.
CO6 - Develop the canonical form of a quadratic form. Construct evolute and envelope of family of curves.

TEXT/REFERENCE BOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons, Singapore, 2012.
2. Grewal B.S., Higher Engineering Mathematics, 41th Edition, Khanna Publications, Delhi, 2011.
3. Veerarajan T., Engineering Mathematics for First Year, II Edition, Tata McGraw Hill Publishers, New Delhi, 2008.
4. Kandaswamy P & Co., Engineering Mathematics for First Year, IX revised edition, S.Chand& Co Pub., 2010.
5. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., 2000.
6. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill, New Delhi, 11th Reprint, 2010.
7. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, Reprint 2008.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration:3 Hrs.**
PART A: 10 Questions carrying 2 marks each – No choice **20 Marks**
PART B: 2 Questions from each unit of internal choice, each carrying 16 marks **80 Marks**