VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED UG SYLLABUS FOR 2018-2022

ENGINEERING MATHEMATICS-I

(Common to all branches)
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2018-19)

Course Code : 18MAT11	**CIE Marks : 40**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 60**
Total Hours:50 (8L+2T per module)	**Exam Hours : 03**
Semester : I	**Credits: 04**

Course Learning Objectives: This course (**18MAT11**) will enable students to master the basic tools of differential & integral calculus, differential equations and elementary linear algebra and become skilled for solving problems in science and engineering.

MODULE-I

Differential Calculus-1:-
Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms (without proof). Centre and circle of curvature (formulae only) –applications to evolutes and involutes.(**RBT Levels: L1 & L2)**

MODULE-II

Differential Calculus-2:-
Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables; Method of Lagrange multipliers with one subsidiary condition. Applications of maxima and minima with illustrative examples. Jacobians-Simple problems.(**RBT Levels: L1 & L2)**

MODULE-III

Integral Calculus:-
Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar co-ordinates. Applications to find area, volume and centre of gravity.
Beta and Gamma functions: definitions, Relation between beta and gamma functions and simple problems.(**RBT Levels: L1 & L2)**

MODULE-IV

Ordinary differential equations(ODE's)of first order:-
Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.
Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equation only.(**RBT Levels: L1 & L2)**

MODULE-V

Elementary Linear Algebra: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method. Eigen values and eigen vectors- Rayleigh's power method. Diagonalization of a square matrix of order two. (**RBT Levels: L1 & L2)**

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.

CO4 : Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also to exhibit the interdependence of line, surface and volume integrals.

CO5 : Make use of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix diagonalization process.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
5. Thomas G.B. and Finney R.L."Calculus and Analytical Geometry"9th Edition, Pearson, 2012.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/