VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

PROPOSED UG SYLLABUS FOR 2018-2022

ENGINEERING MATHEMATICS-II

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

Course Code : 18MAT21	**CIE Marks : 40**
Contact Hours/Week : 04(3L+1T)	**SEE Marks: 60**
Total Hours:50 (8L+2T per module)	**Exam Hours : 03**
Semester : II	**Credits: 04**

Course Learning Objectives: The purpose of the course **18MAT21** is to facilitate the students with concrete foundation of vector calculus, ordinary and partial differential equations, infinite series and numerical methods enabling them to acquire the knowledge of these mathematical tools.

MODULE-I

Vector Calculus:-
Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- Illustrative problems.
Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without proof). Applications to work done by a force and flux.(**RBT Levels: L1 & L2)**

MODULE-II

Differential Equations of higher order:-
Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring and L-C-R circuits.(**RBT Levels: L1 & L2)**

MODULE-III

Partial Differential Equations(PDE's):-
Formation of PDE's by elimination of arbitrary constants / functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.(**RBT Levels: L1 & L2)**

MODULE-IV

Infinite Series: Convergence and divergence of infinite series- Cauchy's root test and D'Alembert's ratio test(without proof)- Illustrative examples.
Power series solutions-Series solution of Bessel's differential equation leading to $J_n(x)$- Bessel's function of first kind-orthogonality. Series solution of Legendre's differential equation leading to $P_n(x)$-Legendre polynomials. Rodrigue's formula (without proof), problems. (**RBT Levels: L1 & L2)**

MODULE V

Elementary Numerical Methods:
Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods(only formulae)- Illustrative examples.
Numerical integration: Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof) – Problems. (**RBT Levels: L1 & L2)**

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

CO1: Solve first order linear/nonlinear differential equations analytically using standard methods.

CO2: Explain various physical models through higher order differential equations and solve such linear ordinary differential equations.

CO3: Understand a variety of partial differential equations and solution by exact methods/method of separation of variables.

CO4: Describe the applications of infinite series and obtain series solution of ordinary differential equations.

CO5: Apply the knowledge of numerical methods in the models of various physical and engineering phenomena.

Question paper pattern:

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

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **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/