IV Semester

ADDITIONAL MATHEMATICS-II
(Mandatory Learning Course: Common to all Programme)
A bridge course for Lateral Entry Students under Diploma quota to BE/B.Tech. programme

Course Code:	**21MATDIP41**	CIE Marks	100
Teaching Hours/Week (L:T:P: S):	3:0:0	Total Marks	100
Total Hours of Pedagogy:	40 hours	Credits:	0

Course objectives:
The mandatory course **21MATDIP41** viz., **Additional Mathematics –II** aims to provide essential concepts of Linear algebra, Second and higher-order differential equations, insight into Elementary probability theory and Numerical methods.

Teaching-Learning Process (General Instructions)
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

- The lecturer method (L) need not be only the traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
- Use of Video/Animation to explain the functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
- Show the different ways to solve the same problem and encourage the students to come up with creative ways to solve them.
- Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1: Linear Algebra

Introduction, Rank of a matrix by elementary row operations, Consistency of system of linear equations, Solution by Gauss Elimination method. Eigenvalues and eigenvectors of a square matrix. Problems.

RBT Levels: L1, L2 and L3 **8 hours**

Teaching-Learning Process	Chalk and talk method/ Powerpoint presentation

Module-2: Higher-Order Differential Equations

Linear homogeneous/nonhomogeneous differential equations of second and higher-order with constant coefficients. Solution by using the inverse differential operator method. [Particular Integrals restricted to $R(x) = e^{ax}$, sinax/ cosax, x^n]

RBT Levels: L1, L2 and L3 **8 hours**

Teaching-Learning Process	Chalk and talk method/ Powerpoint presentation

Module-3: Probability Theory

Introduction, Sample space and Events, Axioms of Probability. Addition and Multiplication theorem. Conditional Probability. Independent events. Baye's theorem, Problems.

RBT Levels: L1, L2 and L3 **8 hours**

Teaching-Learning Process	Chalk and talk method/ Powerpoint presentation

Module-4: Numerical Method -1

Finite differences, Interpolation/extrapolation using Newton's forward and Backward difference formulae (No derivation), Problems. Solution of polynomial and transcendental equations by Newton–Raphson and Regula–Falsi methods (no derivation), Problems. Numerical Integration: Simson's 1/3 rd rule and 3/8 rule, problems.

RBT Levels: L1, L2 and L3 **8 hours**

Teaching-Learning Process	Chalk and talk method/ Powerpoint presentation

Module-5: Numerical Method -II

Numerical solution of first-order ordinary differential equations: Taylor's series method, Modified Euler's method, Runge-Kutta method of order 4, Milne's predictor-corrector method. Problems.

RBT Levels: L1, L2 and L3 **8 hours**

Teaching-Learning Process	Chalk and talk method/ Powerpoint presentation

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1: Test for consistency and solve the system of linear equations

CO2: Solve higher order differential equations

CO3: Apply elementary probability theory and solve related problems

CO4: To interpolate/extrapolate from the given data

CO5: Apply the knowledge of numerical methods in modelling and solving engineering problems

Assessment Details (CIE)

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. The first test at the end of 5th week of the semester
2. The second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of the 4th week of the semester
5. Second assignment at the end of the 9th week of the semester

Course Seminar suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**).

The sum of three tests, two assignments, and a seminar will be out of 100 marks

The student shall secure a minimum of 40% of marks of the course to qualify and become eligible for the award of a degree.

Suggested Learning Resources:

Text Book

1. Higher Engineering Mathematics: B. S. Grewal, Khanna Publishers, New Delhi, 43rd Ed., 2015.

Reference Books:

1. Higher Engineering Mathematics: V. Ramana, McGraw-Hill Education, 11th Ed.
2. Engineering Mathematics: Srimanta Pal & Subodh C. Bhunia, Oxford University Press, 3rd Reprint, 2016.
3. A textbook of Engineering Mathematics: N.P Bali and Manish Goyal, Laxmi Publications, Latest edition.
4. Higher Engineering Mathematics: H.K. Dass and Er. Rajnish Verma, S. Chand Publication (2014).

Weblinks and Video Lectures (e-Resources):

1. http://www.class-central.com/subject/math(MOOCs)
2. http://academicearth.org/
3. http://www.bookstreet.in.
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars