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|-----------------------------------|---|-----------------------|---------|
| <b>Course Title</b>               | <b>Additional Mathematics-II</b><br>(Common to all branches ) | <b>Semester</b>       | II      |
| <b>Course Code</b>                | MVJ19MATDIP41   | <b>CIE</b>            | 50      |
| <b>Total No. of Contact Hours</b> | 40  | <b>SEE</b>            | 50      |
| <b>No. of Contact Hours/week</b>  | 4   | <b>Total</b>          | 100     |
| <b>Credits</b>                    | -   | <b>Exam. Duration</b> | 3 Hours |

**Course objective is to:** This course viz., aims to prepare the students:

- To familiarize the important and basic concepts of Differential calculus and Differential Equation, ordinary/partial differential equations and Vector calculus and analyse the engineering problems.

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|--|--------------|--------|
| <b>Module-1</b>  | <b>L1,L2</b> | 8Hrs.  |
| <p><b>Linear Algebra:</b><br/>Introduction, Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method and problems. Eigen values and Eigen vectors of square matrix and Problems.<br/>Video Link:<br/><a href="https://www.math.ust.hk/~machas/matrix-algebra-for-engineers.pdf">https://www.math.ust.hk/~machas/matrix-algebra-for-engineers.pdf</a><br/><a href="https://nptel.ac.in/content/storage2/courses/122104018/node18.html">https://nptel.ac.in/content/storage2/courses/122104018/node18.html</a></p>  |              |        |
| <b>Module-2</b>  | <b>L1,L2</b> | 8 Hrs. |
| <p><b>Differential calculus:</b><br/>Tangent and normal, sub tangent and subnormal both Cartesian and polar forms. Increasing and decreasing functions, Maxima and Minima for a function of one variable. Point of inflections and Problems<br/><b>Beta and Gamma functions:</b><br/>Beta functions, Properties of Beta function and Gamma function ,Relation Between beta and Gamma function-simple problems.<br/>Video Link:<br/><a href="https://www.youtube.com/watch?v=6RwOoPN2zqE">https://www.youtube.com/watch?v=6RwOoPN2zqE</a><br/><a href="https://www.youtube.com/watch?v=s6F5yjY6jWk&amp;list=PLMLsjhQWWIUqBoTCQDtYlloI-o-9hxp11">https://www.youtube.com/watch?v=s6F5yjY6jWk&amp;list=PLMLsjhQWWIUqBoTCQDtYlloI-o-9hxp11</a><br/><a href="http://tutorial.math.lamar.edu/Classes/DE/IntroPDE.aspx">http://tutorial.math.lamar.edu/Classes/DE/IntroPDE.aspx</a></p> |              |        |
| <b>Module-3</b>  | <b>L1,L2</b> | 8Hrs.  |
| <p><b>Analytical solid geometry :</b><br/>Introduction –Directional cosine and Directional ratio of a line, Equation of line in space- different</p>   |              |        |

forms, Angle between two line, shortest distance between two line, plane and equation of plane in different forms and problems.

Video Link:

<https://www.toppr.com/guides/maths/three-dimensional-geometry/>

<https://www.toppr.com/guides/maths/three-dimensional-geometry/distance-between-skew-lines/>

**Module-4**

**L1,L2,L3**

8 Hrs.

**Probability:**

Random variable, Discrete probability distribution, Mean and variance of Random Variable, Theoretical distribution-Binomial distribution, Mean and variance Binomial distribution -Problems. Poisson distribution as a limiting case of Binomial distribution, Mean and variance of Poisson distribution. Normal Distribution-Basic properties of Normal distribution –standard form of normal distribution and Problems.

Video Link:

<https://nptel.ac.in/courses/111/105/111105041/>

<https://www.mathsisfun.com/data/probability.html>

**Module-5**

**L1,L2,L3**

8 Hrs.

**Partial differential equation:**Formation of PDE’s by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only.

Video Link:

<http://tutorial.math.lamar.edu/Classes/DE/IntroPDE.aspx>

<https://www.studyaaar.com/index.php/module-video/watch/233-cauchys-legendres-de-a-method-of-variation-of-parameters>

**Course outcomes:**

|     |  |
|-----|--|
| CO1 | Apply the knowledge of Matrices to solve the system of linear equations and to understand the concepts of Eigen value and Eigen vectors for engineering problems.  |
| CO2 | Demonstrate various physical models ,find Maxima and Minima for a function of one variable., Point of inflections and Problems .Understand Beta and Gamma function |
| CO3 | Understand the 3-Dimensional geometry basic, Equation of line in space- different forms, Angle between two line and studying the shortest distance .               |
| CO4 | Concepts OF Probability related to engineering applications.   |
| CO5 | Construct a variety of partial differential equations and solution by exact methods.   |

**Text Books:**

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|---|--|
| 1 | B.S. Grewal, “Higher Engineering Mathematics” Khanna Publishers, 43 <sup>rd</sup> Edition, 2013. |
| 2 | Ramana B. V., “Higher Engineering Mathematics”, Tata Mc Graw-Hill, 2006.                         |

**Reference Books:**

|   |  |
|---|--|
| 1 | Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley-India publishers, 10 <sup>th</sup> edition,2014. |
| 2 | G. B. Gururajachar: Calculus and Linear Algebra, Academic Excellent Series Publication, 2018-19            |

**CIE Assessment:**

CIE is based on quizzes, tests, assignments/seminars and any other form of evaluation. Generally, there will be: Three Internal Assessment (IA) tests during the semester (30 marks each), the final IA marks to be awarded will be the average of three tests

- Quizzes/mini tests (10 marks)
- Assignments (10 marks)

**SEE Assessment:**

- i. Question paper for the SEE consists two parts i.e. Part A and Part B. Part A is compulsory and consists of objective type or short answer type questions of 1 or 2 marks each for total of 20 marks covering the whole syllabus.
- ii. Part B also covers the entire syllabus consisting of five questions having choices and may contain sub-divisions, each carrying 16 marks. Students have to answer five full questions.
- iii. One question must be set from each unit. The duration of examination is 3 hours.

**CO-PO Mapping**

| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1   | 3   | 3   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0    | 1    | 1    |
| CO2   | 3   | 3   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0    | 1    | 1    |
| CO3   | 3   | 3   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0    | 0    | 1    |
| CO4   | 2   | 2   | 0   | 3   | 0   | 0   | 0   | 0   | 0   | 0    | 1    | 1    |
| CO5   | 2   | 2   | 0   | 2   | 0   | 0   | 0   | 0   | 0   | 0    | 0    | 1    |

High-3, Medium-2, Low-1