

# IIPM SCHOOL OF ENGINEERING AND TECHNOLOGY

**LESSON PLAN: 2022-23**

**Sub: Th.3. ENGINEERING MATHEMATICS-I**

**1st**

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| **Course** | **: Diploma** | **Semester :** |
| **Duration** | **: 75 hours** |  |
| **Faculty name** | **: ASISH KUMAR DASH** |  |

**SYLLABUS**

### Topic wise distribution of periods and marks

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| **Sl. No.** | **Subject** | **Unit** | **Topic** | **Periods** |
| A | Algebra | 1 | Matrices and Determinant | 18 |
| B | Trigonometry | 2 | Trigonometry | 15 |
| C | Two Dimensional Geometry | 3  4 | Co-ordinate Geometry in Two Dimensions (Straight Line)  Circle | 13  07 |
| D | Three  Dimensional Geometry | 5  6 | Co-ordinate Geometry in  Three Dimensions Sphere | 15  07 |
|  | | | **TOTAL** | **75** |

1. **MATRICES AND DETERMINANTS**
   1. Types of matrices
   2. Algebra of matrices
   3. Determinant
   4. Properties of determinant
   5. Inverse of a matrix (second and third order) (Question should be on second order matrix)
   6. Cramer’s Rule (Question should be on two variables)
   7. Solution of simultaneous equations by matrix inverse method (Question should be on two variables)

### TRIGONOMETRY

* 1. Trigonometrical ratios
  2. Compound angles, multiple and sub-multiple angles (only formulae)
  3. Define inverse circular functions and its properties (no derivation)

### CO-ORDINATE GEOMETRY IN TWO DIMENSIONS (Straight line)

* 1. Introduction of geometry in two dimension
  2. Distance formulae, division formulae, area of a triangle (only formulae no derivation)
  3. Define slope of a line, angle between two lines (only F), condition of perpendicularity and parallelism.
  4. Different forms of straight lines (only formulae)
     1. One point form (ii) two point form (iii) slope form (iv) intercept form

(v) Perpendicular form

* 1. Equation of a line passing through a point and (i) parallel to a line

(ii) Perpendicular to a line

* 1. Equation of a line passing through the intersection of two lines
  2. Distance of a point from a line

### CIRCLE

* 1. Equation of a circle

1. center radius form
2. general equation of a circle
3. end point of diameter form

### CO-ORDINATE GEOMETRY IN THREE DIMENSIONS

* 1. Distance formulae, section formulae, direction ratio, direction cosine, angle between two lines (condition of parallelism and perpendicularity)
  2. Equation of a plane

i) General form, angle between two planes, perpendicular distance of a point from a plane, equation of a plane passing through a point and

i) parallel to a plane (ii) perpendicular to a plane

### SPHERE

* 1. Equation of a sphere
     1. center radius form
     2. general form
     3. two end points of a diameter form (only formulae and problems)

**OBJECTIVE:** Mathematics is the root of engineering. To understand the engineering subjects the knowledge of mathematics is required. This proposed syllabus of mathematics is essential for diploma students of every engineering branch. The maximum number of problems related to engineering should be given to the students in their home assignment. More and more practice of numerical problems is needed for the better understanding of the subject.

**Learning Outcome:**

Analytical and systematic approach towards any problem is developed through learningof this subject.

Mathematics being a versatile subject can be used at every stage of human life.

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| **Sl.n o** | UNIT | **Propose d Week for**  **Teachin g** | **Lectur e No** | **Sub Topic** | **Important Teaching Points** | **Content Source** |
| 1 | **1. MATRICE S AND DETERMI NANTS** | 1st | 1 | Introduction to matrices | Construction of matrices | Elements of Mathemati  cs Vol. 2 |
| 2 | 2 | Types of matrices | Row matrix, column matrix..etc.. | Elements of Mathemati  cs Vol. 2 |
| 3 | 3 | Concepts on determinants | Evaluation of determinants | Elements of Mathemati  cs Vol. 2 |
| 4 | 4 | Properties of determinant | Different proporties | Elements of Mathemati  cs Vol. 2 |
| 5 | 5 | Problems on properties of determinants | problems | Elements of Mathemati  cs Vol. 2 |
| 6 | 6 | Proofs of determinant using properties of  determinants | proofs | Elements of Mathemati  cs Vol. 2 |
| 7 | 2nd | 1 | Proofs of determinant using properties of  determinants | proofs | Elements of Mathemati  cs Vol. 2 |
| 8 | 2 | Operation of matrices | Addition, subtraction,  multiplication etc.. | Elements of  Mathemati cs Vol. 2 |
| 9 | 3 | Problems on operation of matrices | problems | Elements of  Mathemati cs Vol. 2 |
| 10 | 4 | Minor and cofactor of a matrix | Related problems | Elements of  Mathemati cs Vol. 2 |
| 11 | 5 | Adjoint of a matrix and its proporties | Related problems | Elements of Mathemati  cs Vol. 2 |
| 12 | 6 | Inverse of a matrix | Related problems | Elements of Mathemati  cs Vol. 2 |
| 13 | 3rd | 1 | Solution of | Related | Elements |

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|  |  |  |  | system of equation by  Cramer’ rule | problems | of Mathemati  cs Vol. 2 |
| 14 | 2 | Solution of simultaneous equations by  matrix inverse method | Related problems | Elements of Mathemati cs Vol. 2 |
| 15 | 3 | Solution of simultaneous equations by matrix inverse  method | Related problems | Elements of Mathemati cs Vol. 2 |
| 16 | 4 | REVISION OF MATRICES | PROBLEMS | Elements of  Mathemati cs Vol. 2 |
| 17 | 5 | REVISION OF  DETERMINANT S | PROBLEMS |  |
| 18 | 6 | PREVIOUS YEAR QUESTIONS WITH  ANSWERS | DISCUSSION WITH STUDENTS |  |
| 19 | **2**  **TRIGONOMETR Y** | 4th | 1 | Introduction to trigonometry | Definition and concept | Elements of Mathemati  cs Vol. 1 |
| 20 | 2 | Trigonometrical ratios | Formulas and problems | Elements of Mathemati  cs Vol. 1 |
| 21 | 3 | Trigonometrical ratios | Problems | Elements of Mathemati  cs Vol. 1 |
| 22 | 4 | Trigonometrical ratios | Problems | Elements of Mathemati  cs Vol. 1 |
| 23 | 5 | Trigonometrical ratios | problems | Elements of  Mathemati cs Vol. 1 |
| 24 | 6 | Compound angles | Formulas and  problems | Elements  of  Mathemati cs Vol. 1 |
| 25 | 5th | 1 | Compound angles | Problems | Elements of  Mathemati cs Vol. 1 |
| 26 | 2 | multiple and sub- | Formulas and | Elements |

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|  |  |  |  | multiple angles | problems | of Mathemati  cs Vol. 1 |
| 27 | 3 | multiple and sub- multiple angles | Problems | Elements of Mathemati  cs Vol. 1 |
| 28 | 4 | multiple and sub- multiple angles | Problems | Elements of Mathemati  cs Vol. 1 |
| 29 | 5 | Define inverse circular functions | Different types of inverse function | Elements of Mathemati  cs Vol. 1 |
| 30 | 6 | Properties of inverse circular functions | Formulas of inverse trigonometric  function | Elements of Mathemati  cs Vol. 1 |
| 31 | 6th | 1 | REVISION OF TRIGONOMETR IC FUNCTION | PROBLEMS | Elements of Mathemati  cs Vol. 1 |
| 32 | 2 | REVISION OF INVERSE TRIGONOMETR  IC FUNCTION | PROBLEMS |  |
| 33 | 3 | PREVIOUS YEAR QUESTIONS WITH  ANSWERS | DISCUSSION WITH STUDENTS |  |
| 34 | 3. CO-ORDINATE GEOMETRY IN TWO DIMENSIONS  (Straight line) | 4 | Introduction of geometry in two dimension | Fundamental concepts | Elements of Mathemati  cs Vol. 1 |
| 35 | 5 | Distance formulae, division  formulae, area of a triangle | Formula related problems | Elements of Mathemati cs Vol. 1 |
| 36 | 6 | Define slope of a line, angle between two lines | Formula related problems | Elements of  Mathemati cs Vol. 1 |
| 37 | 7th | 1 | condition of  perpendicularity and parallelism. | Formula  related problems | Elements  of  Mathemati cs Vol. 1 |
| 38 | 2 | Different forms of straight lines | Slope intercept form  Slope point form  Two point | Elements of Mathemati cs Vol. 1 |

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|  |  |  |  |  | form etc.. |  |
| 39 | 3 | Different forms of straight lines | Two point form  Intercept form etc… | Elements of Mathemati  cs Vol. 1 |
| 40 | 4 | Equation of a line passing through a point and parallel to a line | Formula related problems | Elements of Mathemati cs Vol. 1 |
| 41 | 5 | Equation of a line passing through a point and Perpendicular to a line | Formula related problems | Elements of Mathemati cs Vol. 1 |
| 42 | 6 | Equation of a line passing through  the intersection of two lines | Formula related problems | Elements of  Mathemati cs Vol. 1 |
| 43 | 8th | 1 | Distance of a point from a line | Formula related problems | Elements of  Mathemati cs Vol. 1 |
| 44 | 2 | Condition of concurrency of three lines | Formula related problems | Elements of  Mathemati cs Vol. 1 |
| 45 | 3 | REVISION OF CO-ORDINATE GEOMETRY IN TWO  DIMENSIONS | Problems | Elements of Mathemati cs Vol. 1 |
| 46 | 4 | PREVIOUS YEAR QUESTIONS WITH  ANSWERS | DISCUSSION WITH STUDENTS |  |
| 47 | **4. CIRCLE** | 5 | Introduction to circles | Definition Centre radius form of a circle | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |
| 48 | 6 | General equation of a circle | Formula with problems | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |

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| 49 |  | 9th | 1 | End point of diameter form of a circle | Formula with problems | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |
| 50 | 2 | Equation of a circle passing through three points | Formula with problems | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |
| 51 | 3 | Concurrency condition of a circle | Formula with problems | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |
| 52 | 4 | Revision of cicle | Problems | Mathemati cs Part- I Textbook for Class XII, NCERT  Publicatio n |
| 53 | 5 | PREVIOUS YEAR QUESTIONS WITH  ANSWERS | DISCUSSION WITH STUDENTS |  |
| 54 | **5. CO-**  **ORDINATE GEOMETRY IN THREE DIMENSION S** | 6 | Introduction to 3D | Definition and concepts | Elements of  Mathemati cs Vol. 2 |
| 55 | 10th | 1 | Distance formulae, section formula | Formula with problems | Elements of  Mathemati cs Vol. 2 |
| 56 | 2 | direction ratio, direction cosine | Formula with problems | Elements of Mathemati  cs Vol. 2 |
| 57 | 3 | Centroid of a triangle | Formula with problems | Elements of Mathemati  cs Vol. 2 |
| 58 | 4 | Structur of a | Formula with | Elements |

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|  |  |  |  | tetrahedron | problems | of Mathemati  cs Vol. 2 |
| 59 | 5 | angle between two lines | (condition of parallelism and  perpendicularit y) | Elements of Mathemati cs Vol. 2 |
| 60 | 6 | Projection form of a line | Formula with problems | Elements of Mathemati  cs Vol. 2 |
| 61 | 11th | 1 | Introduction to plane | Definition and concepts | Elements of Mathemati  cs Vol. 2 |
| 62 | 2 | Equation of a plane | General form | Elements of  Mathemati cs Vol. 2 |
| 63 | 3 | angle between two planes | Formula with problems | Elements of  Mathemati cs Vol. 2 |
| 64 | 4 | perpendicular distance of a pointfrom a plane | Formula with problems | Elements of  Mathemati cs Vol. 2 |
| 65 | 5 | equation of a plane passing through a point and parallel to a  plane | Formula with problems | Elements of Mathemati cs Vol. 2 |
| 66 | 6 | equation of a plane passing through a point and perpendicular  to a plane | Formula with problems | Elements of Mathemati cs Vol. 2 |
| 67 | 12th | 1 | **REVISION OF CO- ORDINATE GEOMETRY IN THREE DIMENSIONS** | Problems | Elements of Mathemati cs Vol. 2 |
| 68 | 2 | PREVIOUS YEAR QUESTIONS WITH  ANSWERS | DISCUSSION WITH STUDENTS |  |
| 69 | **5. SPHERE** | 3 | Introduction to sphere | Definition and concept | Elements of  Mathemati cs Vol. 2 |
| 70 | 4 | Equation of a | center radius | Elements |

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|  |  |  |  | sphere | form | of Mathemati  cs Vol. 2 |
| 71 | 5 | Equation of a sphere | general form | Elements of Mathemati  cs Vol. 2 |
| 72 | 6 | Equation of a sphere | two end points of a diameter form | Elements of Mathemati  cs Vol. 2 |
| 73 | 13th | 1 | Equation of a sphere passing through four  points | Problems | Elements of Mathemati  cs Vol. 2 |
| 74 | 2 | REVISION OF SPHERE | Problems | Elements of Mathemati  cs Vol. 2 |
| 75 | 3 | PREVIOUS YEAR QUESTIONS  WITH ANSWERS | DISCUSSION WITH STUDENTS |  |

# Text book suggested

1. Elements of Mathematics \_ Vol. \_ 1 & 2

# Reference Books:

## 1. Mathematics Part- I & Part- II- Textbook for Class XII, NCERT Publication

Signature of

## Faculty Member Principal