



IIPM SCHOOL OF ENGINEERING AND TECHNOLOGY

LESSON PLAN: 2023-24

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

Course : Diploma Semester : 1st
Duration : 75 hours
Faculty name : ASISH KUMAR DASH

SYLLABUS

Topic wise distribution of periods and marks

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

1) MATRICES AND DETERMINANTS

- a) Types of matrices
- b) Algebra of matrices
- c) Determinant
- d) Properties of determinant
- e) Inverse of a matrix (second and third order)
(Question should be on second order matrix)
- f) Cramer's Rule (Question should be on two variables)
- g) Solution of simultaneous equations by matrix inverse method
(Question should be on two variables)

2) TRIGONOMETRY

- a) Trigonometrical ratios
- b) Compound angles, multiple and sub-multiple angles (only formulae)
- c) Define inverse circular functions and its properties (no derivation)

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

- a) Introduction of geometry in two dimension
- b) Distance formulae, division formulae, area of a triangle (only formulae no derivation)
- c) Define slope of a line, angle between two lines (only F), condition of perpendicularity and parallelism.
- d) Different forms of straight lines (only formulae)
 - i) One point form (ii) two point form (iii) slope form (iv) intercept form
 - (v) Perpendicular form
- e) Equation of a line passing through a point and (i) parallel to a line
(ii) Perpendicular to a line
- f) Equation of a line passing through the intersection of two lines
- g) Distance of a point from a line

4) CIRCLE

- a) Equation of a circle
 - (i) center radius form
 - (ii) general equation of a circle
 - (iii) end point of diameter form

5) CO-ORDINATE GEOMETRY IN THREE DIMENSIONS

- a) Distance formulae, section formulae, direction ratio, direction cosine, angle between two lines (condition of parallelism and perpendicularity)
- b) 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

6) SPHERE

- a) Equation of a sphere
 - i) center radius form
 - ii) general form
 - iii) 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 learning of this subject.

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

| Sl.no | UNIT | Proposed Week for Teaching | Lecture No | Sub Topic | Important Teaching Points | Content Source |
|-------|-------------------------------------|----------------------------|------------|--|---|--------------------------------|
| 1 | 1. MATRICES AND DETERMINANTS | 1 st | 1 | Introduction to matrices | Construction of matrices | Elements of Mathematics Vol. 2 |
| 2 | | | 2 | Types of matrices | Row matrix, column matrix..etc.. | Elements of Mathematics Vol. 2 |
| 3 | | | 3 | Concepts on determinants | Evaluation of determinants | Elements of Mathematics Vol. 2 |
| 4 | | | 4 | Properties of determinant | Different properties | Elements of Mathematics Vol. 2 |
| 5 | | | 5 | Problems on properties of determinants | problems | Elements of Mathematics Vol. 2 |
| 6 | | | 6 | Proofs of determinant using properties of determinants | proofs | Elements of Mathematics Vol. 2 |
| 7 | | 2 nd | 1 | Proofs of determinant using properties of determinants | proofs | Elements of Mathematics Vol. 2 |
| 8 | | | 2 | Operation of matrices | Addition, subtraction, multiplication etc.. | Elements of Mathematics Vol. 2 |
| 9 | | | 3 | Problems on operation of matrices | problems | Elements of Mathematics Vol. 2 |
| 10 | | | 4 | Minor and cofactor of a matrix | Related problems | Elements of Mathematics Vol. 2 |
| 11 | | | 5 | Adjoint of a matrix and its properties | Related problems | Elements of Mathematics Vol. 2 |
| 12 | | | 6 | Inverse of a matrix | Related problems | Elements of Mathematics Vol. 2 |
| 13 | | 3 rd | 1 | Solution of | Related | Elements |

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

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| | | | | multiple angles | problems | of Mathematics Vol. 1 |
| 27 | | | 3 | multiple and sub-multiple angles | Problems | Elements of Mathematics Vol. 1 |
| 28 | | | 4 | multiple and sub-multiple angles | Problems | Elements of Mathematics Vol. 1 |
| 29 | | | 5 | Define inverse circular functions | Different types of inverse function | Elements of Mathematics Vol. 1 |
| 30 | | | 6 | Properties of inverse circular functions | Formulas of inverse trigonometric function | Elements of Mathematics Vol. 1 |
| 31 | | 6 th | 1 | REVISION OF TRIGONOMETRIC FUNCTION | PROBLEMS | Elements of Mathematics Vol. 1 |
| 32 | | | 2 | REVISION OF INVERSE TRIGONOMETRIC 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 Mathematics Vol. 1 |
| 35 | | | 5 | Distance formulae, division formulae, area of a triangle | Formula related problems | Elements of Mathematics Vol. 1 |
| 36 | | | 6 | Define slope of a line, angle between two lines | Formula related problems | Elements of Mathematics Vol. 1 |
| 37 | | 7 th | 1 | condition of perpendicularity and parallelism. | Formula related problems | Elements of Mathematics Vol. 1 |
| 38 | | | 2 | Different forms of straight lines | Slope intercept form Slope point form Two point | Elements of Mathematics Vol. 1 |

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| | | | | | form etc.. | |
| 39 | | | 3 | Different forms of straight lines | Two point form Intercept form etc... | Elements of Mathematics Vol. 1 |
| 40 | | | 4 | Equation of a line passing through a point and parallel to a line | Formula related problems | Elements of Mathematics Vol. 1 |
| 41 | | | 5 | Equation of a line passing through a point and Perpendicular to a line | Formula related problems | Elements of Mathematics Vol. 1 |
| 42 | | | 6 | Equation of a line passing through the intersection of two lines | Formula related problems | Elements of Mathematics Vol. 1 |
| 43 | | 8 th | 1 | Distance of a point from a line | Formula related problems | Elements of Mathematics Vol. 1 |
| 44 | | | 2 | Condition of concurrency of three lines | Formula related problems | Elements of Mathematics Vol. 1 |
| 45 | | | 3 | REVISION OF CO-ORDINATE GEOMETRY IN TWO DIMENSIONS | Problems | Elements of Mathematics 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 | Mathematics Part- I Textbook for Class XII, NCERT Publication |
| 48 | | | 6 | General equation of a circle | Formula with problems | Mathematics Part- I Textbook for Class XII, NCERT Publication |

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

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

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| | | | | sphere | form | of Mathematics Vol. 2 |
| 71 | | | 5 | Equation of a sphere | general form | Elements of Mathematics Vol. 2 |
| 72 | | | 6 | Equation of a sphere | two end points of a diameter form | Elements of Mathematics Vol. 2 |
| 73 | | 13th | 1 | Equation of a sphere passing through four points | Problems | Elements of Mathematics Vol. 2 |
| 74 | | | 2 | REVISION OF SPHERE | Problems | Elements of Mathematics 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