COURSE TITLE   : TECHNICAL MATHEMATICS
COURSE CODE   :
COURSE CATEGORY: F
PERIODS/WEEK   : 6
PERIODS/SEMESTER: 108
CREDITS   : 6

TIME SCHEDULE

Module	Topic	Periods
1	Matrices Determinants	27
2	Binomial Series Trigonometric Functions	27
3	Properties of Trigonometric Functions Properties of Triangles	27
4	Solution of Triangles Coordinate Geometry	27
	TOTAL	**108**

On completion of the units, the student will be able to

MODULE -I
1.1.0 Matrices
1.1.1   Define a matrix
1.1.2   Identify the type of a given matrix(Square, Unit, Singular etc)
1.1.3   Perform operations of addition and multiplication of a given matrix
1.1.4   Define – transpose, adjoint and inverse of a matrix
1.1.5   Find the inverse of 2 x 2 and 3 x 3 matrices
1.1.6   Solve linear equations by using the inverse of the coefficient matrix

1.2   Determinants
1.2.1   Evaluate determinants of second and third order
1.2.2   Find the minors and cofactors of the elements in a determinant
1.2.3   Solve simultaneous linear equations in 3 unknowns using Cramer's rule.

MODULE –II

2.1.0 Binomial series
2.1.1   Definition of Factorial, State the meaning of nCr
2.1.2   Derive formula for nCr and the proof of nCr = nCn-r
2.1.3   State the Binomial theorem for positive integers
2.1.4   Expansion using Binomial Theorem
2.1.5   Find a given term , Middle term(s),term independent of x, coefficient of x^n in a binomial expansion

2.2.0 Trigonometric functions
2.2.1 Define trigonometric functions.
2.2.2 Describe signs of trigonometric functions in each quadrant
2.2.3 Find other functions, given a trigonometric function and its quadrant
2.2.4 Review the trigonometric values of the angles 0°,30°,45°,60°and 90°.
2.2.5 Discuss the graph of sinx,cosx,tanx

MODULE – III

3.1.0 Properties of Trigonometric Functions
3.1.1 State the identities for sin (A± B), cos (A± B), tan (A ±B).
3.1.2 Solve the problems of the types
    (1)   Prove that $\dfrac{Cos\ A - Sin\ A}{Cos\ A + Sin\ A} = \tan(45° -A)$
3.1.3 Prove the formulas for Sin 2A, Cos 2A, tan 2A, Sin 3A and Cos 3A
3.1.4 Solve the problems of the type: if Sin A = 0.6 and A is acute, find sin 2A
3.1.5 Express sum or difference of two sines or two cosines as a product and vice versa.
3.1.6 Apply product formulae to do the problems of the type
    (1) $\dfrac{Sin\ A + Sin\ 3A + Sin\ 5A}{Cos\ A + Cos\ 3A + Cos\ 5A} = \tan 3A$
    (2) Sin 10° Sin 50° Sin 70° = 1/8

3.2.0 Properties of Triangles
3.2.1 State and prove the following identities for acute angle
    1) Sine Rule
$$\frac{a}{Sin\ A} = \frac{b}{Sin\ B} = \frac{c}{SinC} = 2R$$
    2) Cosine Rule
$$a^2 = b^2 + c^2 - 2bc\ \cos A$$
    3) Projection Formula
$$a = b\ Cos\ C + c\ Cos\ B$$

    4) Napier's formula
$$\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c}\ \cot(A/2)$$

MODULE – IV

4.1.0 Solution of triangles
4.1.1 Solve a triangle, given
    1)   Three sides using cosine rule
    2)   Two sides and the included angle by using Napier's formula.
4.2.0 Co-ordinate Geometry
4.2..1 Define slope and intercepts of a straight line
4.2..2 Find the slope of a line joining two points (x_1,y_1) and (x_2,y_2)
4.2..3 Derive the equation of a straight line of the form
    1) $y = mx + c$
    2) $y-y_1 = m(x-x_1)$
    3) $\dfrac{y-y_1}{y_1-y_2} = \dfrac{x-x_1}{x_1-x_2}$

4) $\underline{x} + \underline{y} = 1$
    a   b

4.2..4   Find the equation of a line given suitable data using any of the above form.

4.2..5   Find the slope and intercepts on the axes, given a linear equation in 'x' and 'y'.

4.2..6   Find the point of intersection of two lines whose equations are given

4.2..7   Find the angle between two lines

4.2..8   Find the condition for two lines are
1)   Parallel
2)   Perpendicular

4.2..9 Find the equation of the line
1)   Parallel and
2)   Perpendicular to a given line and passing through a given point.

CONTENT DETAILS

MODULE – I

1.1 Matrices
Matrix notation, order of a matrix, and type of matrices: - Square matrix, unit matrix, Zero matrix, and Singular matrix. Transpose of a matrix, symmetric and skew-symmetric matrices, sum and product of matrices, Adjoint of a matrix, inverse of a matrix (definition only) and problems.

1.2 Determinants
Determinants of second and third order matrices, minors and cofactors, Cramer's rule, solution of simultaneous linear equations in three unknowns by Cramer's rule. Elimination of three linear equations in two unknowns.

MODULE - II

2.1 Binomial series
Idea of nCr, Value of nCr (no derivation). Binomial theorem for positive integers (no proof), finding a given term in a Binomial Expansion.

2.2 Trigonometric functions
Definition of trigonometric functions of an angle in any quadrant, Signs of trigonometric functions of related angles, Given a trigonometric functions of an angle and its quadrant find others. Review the trigonometric values of the angles $0°,30°,45°,60°,90°$.Graph of sinx,cosx,tanx

MODULE – III

3.1   Properties of trigonometric functions
Addition formulae, Multiple and Sub-multiple formulae, Sum and Product formulae, simple problems.

3.2   Properties of triangles
State and prove Sine rule, Cosine rule , projection formula and Napier's formula

MODULE - IV

4.1   Solution of triangle
Solve the triangle given
1. Three sides (using cosine rule)
2. Two sides and the included angle (use Napier's formula)

4.2   Co-ordinate geometry
Straight line-Slope, Equations of a straight line in the forms
1)y=mx+C

2) $y-y_1 = m(x-x)$,

3) $\dfrac{y-y_1}{y_1-y_2} = \dfrac{x-x_1}{x_1-x_2}$

4) $x/a + y/b = 1$

Points of Intersection of two lines, Angle between two lines, Conditions for two lines to be parallel and perpendicular

REFERENCE BOOKS

1. Washington A.J.   : Basic Technical Mathematics, Addison Wesley
2. Engineering Mathematics : S.S.Sastry
3. Green John. R   : Calculus with Analytic Geometry, McGraw Hill Book Co.,
4. Karuppannan. T.C.   : Mathematics for Technical Students, Macmillan and Co.,
5. T.T.T.I. Madras   : Mathematics for Technicians Vol. I and II,
                          Sehgal Educational Consultants (P) Ltd, Faridabad
6. Shanti Narayanan   : Algebra