Course Name : 03 Years Diploma in Engineering

Semester : First

Subject Title : Engineering Mathematics-1

Subject Code : 102

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
L TH	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
03	01		100	80	20	26	40	3 Hrs

NOTE:

Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.

RATIONALE:

Mathematics provides foundation for all engineering subjects. Deep thought is given while selecting topics of this subject known as “Engineering Mathematics” which intends to teach students basic facts, concepts and principles of mathematics as a tool to analyze engineering problems. It lays down the foundation for understanding core engineering and technology subjects.

OBJECTIVE:

This subject helps the students to develop logical thinking, which is useful in comprehending the principles of all other subjects. Analytical and systematic approach towards any problem is developed through learning of this subject. Mathematics being a versatile subject can be used as a tool at every stage of human life.

Sub Objective:

This subject is divided into four units 1) Algebra, 2) Trigonometry, 3) Coordinate Geometry and 4) Vector. Upon completion of these Units the student shall be able to:

1.1 Use Logarithms in engineering calculations
1.2 Resolve Rational Fraction into sum of Partial Fractions in engineering problems
1.3 Use Matrices for solving engineering problems
1.4 Understand the concept of Binomial Expansion and use of Permutation & Combination

2.1 Solve simple problems on Compound Angles
2.2 Solve problems using the formulae for Multiple and Sub- multiple Angles
2.3 Apply Transformations for solving the problems in Trigonometry
2.4 Use Inverse Trigonometric Functions for solving engineering problems
2.5 Understand Properties of triangles

3.1 Appreciate the concept of position of any point in a plane or in space
3.2 Distance between two points and its application in solving engineering problems
3.3 Solve the problems on straight line
3.4 Solve the problems on Circles

4.1 Appreciate the concept of a new type of physical quantity called Vector
4.2 Algebra of Vectors
4.3 Solve engineering problems like work done, moment of force about a point as well as about a line.

Chaper no	NAME OF TOPICS	Hours	Marks
	ALGEBRA		
1	**1.1 Prerequisites Revision of** ▪ Arithmetic, Geometric and Harmonic Progressions, ▪ Formula of nth term and sum to n-terms of A.P. and G.P. ▪ Expression of $\sum n$, $\sum n^2$ and $\sum n^3$. ▪ Quadratic equations with real coefficients and relation between their roots & coefficient	01	01
	1.2 Logarithms: ▪ Definition of logarithm (Natural and Common logarithm.) ▪ Laws of logarithm ▪ Examples based on 1.2.1 to 1.2.2	03	04
	1.3 PARTIAL FRACTION ▪ Definition of Polynomial Fraction Proper & Improper Fractions and definition of Partial fractions. ▪ To Resolve proper fraction into partial fraction with denominator containing non repeated linear factors, repeated linear factors and irreducible non repeated quadratic factors. ▪ To resolve improper fraction into partial fraction.	03	06

	.4 DETERMINANT AND MATRICES. **Determinant ---------- 4 Marks** ▪ Definition and expansion of determinants of order 2 and 3. ▪ Cramer's rule to solve simultaneous equations for 2 and 3 unknowns. **Matrices---------- 12Marks** ▪ Definition of a matrix of order m X n and types of Matrices with examples. ▪ Algebra of matrices such as equality, addition, subtraction, scalar multiplication and multiplication of two matrices. ▪ Transpose of a matrix. ▪ Minor, Cofactor of an element of a matrix, adjoint of matrix and Inverse of matrix by Adjoint method. ▪ Solution of simultaneous equations containing 2 and 3 unknowns by matrix inversion method. ▪ Idea of Rank of Matrix and their calculation	08	16
	1.5 BINOMIAL THEOREM ▪ Definition of factorial notation, definition of permutation and combinations with formula (without proof). ▪ Derivation of simple identities and solution based on it ▪ Binomial theorem for positive index. ▪ General term, Middle term, independent term and coefficient of x^n ▪ Binomial theorem for negative index (only idea). ▪ Approximate value (only formula)	02	04
2	TRIGONOMETRY		
	2.1 REVISION ▪ Measurement of an angle (degree and radian). Relation between degree and radian. ▪ Trigonometrical ratios of 0^0 , 30^0 , 45^0 , 60^0, 90^0, $90^0 \pm \theta$, $180^0 \pm \theta$ and $360^0 \pm \theta$ ▪ Fundamental identities.	01	01
	2.2 TRIGONOMETRIC RATIOS OF ALLIED, COMPOUND, MULTIPLE & SUBMULTIPLE ANGLES Questions based on numerical computations.	03	06
	2.3 Transformation formula of Product into sums or difference and vice versa, simple problems based on it	03	06
	2.4 INVERSE TRIGONOMETRIC RATIOS ▪ Definition of inverse trigonometric, ratios, Principal values of	02	04

	inverse trigonometric ratios. ▪ Relation between inverse trigonometric ratios.		
	2.5 PROPERTIES OF TRIANGLE Sine, Cosine, Projection and tangent rules (without proof). Simple problems.	02	04
03	COORDINATE DISTANCES		
	3.1 POINT AND DISTANCES ▪ Distance formula, Section formula, midpoint, centroid of triangle. ▪ Area of triangle and condition of collinearity.	**2**	**04**
	3.2 STRAIGHT LINE ▪ Slope and intercept of straight line. ▪ Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line ▪ Angle between two straight lines condition of parallel and perpendicular lines. ▪ Intersection of two lines. ▪ Length of perpendicular from a point on the line and perpendicular distance between parallel lines.	**05**	**10**
	3.3 CIRCLE ▪ Equation of circle in standard form, centre – radius formula and diameter formula. ▪ General equation of circle, its centre and radius, simple problem	**02**	**04**
	VECTOR ALGEBRA		
	4 VECTORS ▪ Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication) ▪ Dot (Scalar) product with properties. ▪ Vector (Cross) product with properties.	03	06
	4.4 Applications 4.4.1 Work done and moment of force/s about a point & line	**02**	04
	TOTAL:	42	80

LEARNING RESOURCES:

Sr. No.	Title	Authors	Publications
1	Mathematics: A Textbook for Class XI Part I &II	National Council of Educational Research and Training	
2	Mathematics: A Textbook for Class XII Part I &II	National Council of Educational Research and Training	
3	Mathematics for Class XI Volume I and II	R. D. Sharma	Dhanpat Rai Publication, New Delhi.
4	Mathematics for Class XII Volume I and II	R. D. Sharma	Dhanpat Rai Publication, New Delhi.
5	Co ordinate Geometry	S. L. Loney	S. Chand Publication
6	Trigonometry	S. L. Loney	S. Chand Publication
7	Higher Algebra	H. S. Hall & S. R. Knight	Metric edition, Book Palace, New Delhi
8	Higher Sr. Secondary School Mathematics for XI & XII	R.S. Agrawal	Bharti Bhawan, Patna
9	Vector Algebra	L Prasad	Bharti Bhawan, Patna

Note:

In board examination, question setter may be advised to select 20% questions of objective, 30% of short type and remaining 50% of long type based on basic concepts, formula and calculations respectively.

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