ANNEXURE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS
M-SCHEME
(Implements from the Academic year 2015-2016 onwards)

Course Name :All branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and film & TV.

Subject Code : 30012

Semester : I Semester
Subject Title : **ENGINEERING MATHEMATICS – I**

TRAINING AND SCHEME OF EXAMINATION:

No. of Weeks per Semester: 15 Weeks

Subject	Instructions		Examination			
Engineering Mathematics - I	Hours / Week	Hours / Semester	Marks			Duration
	8 Hrs.	120 Hrs.	Internal Assessment	Semester Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS:

Sl.No.	Topics	Time (Hrs.)
1	Algebra – Determinants, Matrices and Binomial Theorem	22
2	Complex Numbers	22
3	Trigonometry	22
4	Inverse Trigonometric Ratios & Differential Calculus - I	22
5	Differential Calculus – II	22
Test and Tutorial		10
TOTAL		**120**

Rationale:

This subject being a branch of “Logic“ is classified as one of the basic sciences and intends to teach students, basic facts, concepts and principles of mathematics as a tool to analyse Engineering problems. Mathematics lay down foundation for understanding core technology subjects.

Objectives:

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 at every stage of human life. The student will be able to acquire knowledge of algebra of complex numbers and its uses to solve equations having non-real solutions and knowledge of differentiation, principles and different methods, develop the ability to apply these methods to solve technical problems to execute management plans with precision.

30012 ENGINEERING MATHEMATICS - I

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF TOPICS	Hours
I	**ALGEBRA**	
	Chapter - 1.1 DETERMINANTS Definition and expansion of determinants of order 2 and 3. Properties of determinants (not for examination). Solution of simultaneous equations using Cramer's rule (in 2 and 3 unknowns) - Simple Problems.	7
	Chapter - 1.2 MATRICES Definition –Singular Matrix, Non-singular Matrix, Adjoint of a matrix and Inverse of a matrix up to 3 x 3 only. Simple Problems. Definition – Rank of a matrix. Finding rank of a matrix by determinant method (matrix of order 3 x 4) Simple Problems.	7
	Chapter - 1.3 BINOMIAL THEOREM Definition of Factorial notation - Definition of Permutation and Combinations – values of nP_r and nC_r (results only) [not for examination]. Binomial theorem for positive integral index (statement only) - Expansion - Finding of general term, middle term, coefficient of x^n and term independent of x. Simple Problems. Binomial Theorem for rational index up to - 3 (statement only), Expansions only for - 1, - 2 and - 3.	8

II	**COMPLEX NUMBERS**	
	Chapter - 2.1 ALGEBRA OF COMPLEX NUMBERS Definition – Real and Imaginary parts, Conjugates, Modulus and amplitude form, Polar form of a complex number, multiplication and division of complex numbers (geometrical proof not needed)– Simple Problems .Argand Diagram – Collinear points, four points forming square, rectangle, rhombus and parallelogram only . Simple Problems.	**8**
	Chapter - 2.2 DE MOIVER'S THEOREM Demoivre's Theorem (statement only) – related simple problems.	**7**
	Chapter - 2.3 ROOTS OF COMPLEX NUMBERS Finding the n^{th} roots of unity - solving equation of the form $x^n \pm 1 = 0$ where $n \leq 7$. Simple Problems.	**7**
III	**TRIGONOMETRY**	
	Chapter – 3.1 COMPOUND ANGLES Expansion of $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$ [without proof] . Problems using above expansions.	**8**
	Chapter - 3.2 MULTIPLE ANGLES Trigonometrical ratios of multiple angles of 2A and 3A and sub multiple angles. Simple Problems.	**7**
	Chapter - 3.3 SUM AND PRODUCT FORMULAE Trigonometrical ratios of sum and product formulae. Simple Problems.	**7**
IV	**INVERSE TRIGONOMETRIC RATIOS & DIFFERENTIAL CALCULUS – I**	
	Chapter - 4.1 INVERSE TRIGONOMETRIC FUNCTIONS Definition of inverse trigonometric ratios – Relation between inverse trigonometric ratios. Simple Problems.	**7**
	Chapter - 4.2 LIMITS Definition of Limits. Problems using the following results: (i) $\lim_{x \to a} \frac{x^n - a^n}{x - a} = n a^{n-1}$ (ii) $\lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1$ and (iii) $\lim_{\theta \to 0} \frac{\tan \theta}{\theta} = 1$ (θ - in radians) (results only) . Simple Problems.	**7**
	Chapter - 4.3 DIFFERENTIATION Definition – Differentiation of x^n , $\sin x$, $\cos x$, $\tan x$, $\cos ec\, x$, $\sec x$, $\cot x$, $\log x$, e^x , $u \pm v$, uv , uvw , $\frac{u}{v}$ $(v \neq 0)$ (results only). Simple problems using the above results.	**8**

V	**DIFFERENTIAL CALCULUS – II**	
	Chapter – 5.1 DIFFERENTIATION METHODS Differentiation of function functions (chain rule), Inverse Trigonometric functions and Implicit functions. Simple Problems.	**8**
	Chapter - 5.2 SUCCESSIVE DIFFERENTIATION Successive differentiation up to second order (parametric form not included). Definition of differential equation, order and degree, formation of differential equation. Simple Problems.	**7**
	Chapter - 5.3 PARTIAL DIFFERENTIATION Definition – Partial differentiation of two variables up to second order only. Simple Problems.	**7**

Text Book:

1. Mathematics for Higher Secondary – I year and II year (Tamil Nadu Text Book Corporation)

Reference Book:

1. Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai
2. Engineering Mathematics – Dr.P.Kandasamy & Others, S.Chand & Co Ltd, New Delhi

Board Examination - Question paper pattern

Time: 3 Hrs. **Max.Marks: 75**

PART A - 5 Questions to be answered out of **8** for 2 marks each.

PART B - 5 Questions to be answered out of **8** for 3 marks each.

PART C - All the **5** Questions to be answered

Each question in PART C will contain **3** Sub questions, out of these **3** Sub questions **2** Sub questions is to be answered for 5 marks each.

PART A	**5** x 2 marks	**10** Marks
PART B Short answer type questions	**5** x 3 marks	**15** Marks
PART C Descriptive answer type questions Each question in PART C will contain **3** Sub questions, out of these **3** Sub questions **2** Sub questions is to be answered for 5 marks each.	**5 x 2** x 5 marks	**50** Marks
Total		**75** Marks

Out of the **3 Sub questions** in **PART C, one sub question** must be on problem based to test the analytical ability/logical ability /diagnostic ability/conceptual ability relevant to that subject content. Equal weightage is to be given to whole syllabus.

Clarks table will not be permitted for the Board Examinations.