

**SRI RAMAKRISHNA MISSION VIDYALAYA
POLYTECHNIC COLLEGE**
(AN AUTONOMOUS & ISO 9001:2008 CERTIFIED INSTITUTION)

CURRICULUM AND SYLLABUS

(APPLICABLE TO STUDENTS ADMITTED FROM
2016 - 2017 ACADEMIC YEAR ONWARDS)
(R5 – SCHEME)

**FIRST YEAR BASIC ENGINEERING
(ALL BRANCHES)**



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R5 – SCHEME : R E G U L A T I O N S

Description of the Course:

The Course for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters. This Curriculum for the Diploma Course is applicable for the candidates admitted from 2016-2017 academic year onwards.

Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he has undergone the prescribed course of study in this College for a period of not less than 3 academic years when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination. The minimum and maximum period for completion of Diploma Course is as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time Regular	3 Years	6 Years
Full Time(Lateral Entry)	2 Years	5 Years

Age Limit: No age limit

Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects.

Examinations:

Autonomous Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester. The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for final external Autonomous Examination.

Continuous Internal Assessment:

A. FOR THEORY SUBJECTS:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i) Subject Attendance 5 Marks
 (Award of marks for subject attendance to each subject Theory/Practical will be as per the range given below)

80% - 83%	1 mark
84% - 87%	2 marks
88% - 91%	3 marks
92% - 95%	4 marks
96% - 100%	5 marks

ii) Test 10 Marks

Two Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: **5 marks**

The Test - III is to be the Model test covering all the five units and the marks so obtained will be reduced to : **5 marks**

Total 10 marks

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit - I & II	End of 6 th week	50	2 Hrs
Test II	Unit - III & IV	End of 12 th week	50	2 Hrs
Test III	Model Examination - Compulsory Covering all the 5 Units. (End Semester Exam question paper pattern)	End of 15 th week	75	3 Hrs

iii) Assignment**10 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks.

B. FOR PRACTICAL SUBJECTS:

The Internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

- | | |
|--|----------|
| a) Attendance (Award of marks same as theory subjects) | 05 Marks |
| b) Procedure / observation and tabulation / Other Practical related Work | 10 Marks |
| c) Record writing | 10 Marks |

TOTAL 25 Marks

- *All the Experiments / Exercises indicated in the syllabus should be completed and the same to be given for final semester examinations.*
- *The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.*
- *At the end of the semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20 + 5 = 25 marks)*
- *The students have to submit the duly signed bonafide record note book / file during the Practical Examinations.*
- *All the marks awarded for assignments, Tests and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

Project Work:

The students of all branches have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, The Project work must be reviewed twice in a semester.

a) Internal assessment mark for Project Work & Viva Voce:

- | | |
|--|----------|
| Project Review - I | 10 marks |
| Project Review - II | 10 marks |
| Attendance (Award of marks same as theory subject pattern) | 05 marks |

Total 25 marks**b) Allocation of Marks for Project Work & Viva Voce in End Semester Exam:**

- | | |
|------------------------------|----------|
| Viva-voce | 25 marks |
| Demonstration / Presentation | 20 marks |

Total 45 marks

c) Written Test Mark (from 3 topics for 1 hour duration):

i) Entrepreneurship	5 questions x 2 marks	=	10 marks
ii) Environment Management	5 questions x 2 marks	=	10 marks
iii) Disaster Management	5 questions x 2 marks	=	10 marks
	Total		30 marks

Selection of Questions should be from Question Bank and no choice need be given to the candidates.

Project Work & Viva Voce in Examination	45 Marks
Written Test Mark (from 3 topics for 1 hour duration)	30 Marks
TOTAL	75 Marks

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Viva Voce end semester examination.

Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he has undergone the prescribed course of study successfully and pass all the subjects prescribed in the curriculum.
2. A candidate shall be declared to have passed the examination in a subject if he secures not less than 40% in theory subjects and 50% in practical subjects out of the total prescribed maximum marks including both the Internal Assessment and the End semester Examinations marks put together, subject to the condition that he secures at least a minimum of 30 marks out of 75 marks in the Theory Examinations and a minimum of 35 marks out of 75 marks in the Practical Examinations.

Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2019 onwards (Joined in first year in 2016-2017) in R5 - scheme is being done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in *First Class with Superlative Distinction*, if he secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class with Distinction:

A candidate will be declared to have passed in *First Class with Distinction*, if he secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class:

A candidate will be declared to have passed in *First Class*, if he secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

Second Class:

All other successful candidates will be declared to have passed in *Second Class*.

Duration of a period in the Class Time-table:

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and lunch break in a day should be 7 hours corresponding to 7 periods of instruction (Theory & Practical).

Autonomous Examination - Exam Pattern:

Autonomous Examinations for all the Diploma Courses are being conducted in the following Pattern:

Semester	Span of Study	Examination
I, III & V Sem	June - October	October
II, IV & VI Sem	December - April	April

Requirements to appear for Examinations:

A candidate will be permitted to appear for the Autonomous examinations, only if he secures a minimum of overall 80% attendance in the semester concerned.

Condonation of Attendance:

The minimum overall percentage of attendance required for a candidate to become eligible to write the Autonomous end semester examination is 80%. Under extraordinary circumstances, for genuine and valid reasons, Medical reasons, the Principal may condone up to a maximum of 10% shortage to a candidate, subject to the condition that he satisfies all the other requirements to appear for the Autonomous Examination. Under no circumstances a candidate with attendance less than 70% shall be permitted to write the Autonomous Examinations. The condonement of 10% shortage shall not be done as a routine to all candidates, but only for genuine cases; it shall not be claimed as a matter of right by all candidates.

FIRST YEAR BASIC ENGINEERING

CURRICULUM OUTLINE

FIRST SEMESTER

SUB. CODE	SUBJECT	HOURS PER WEEK			
		Theory	Tutorial / Drawing	Practical	Total
R5 -101	Communication English - I	5			5
R5 -102	Engineering Mathematics - I	4			4
R5 -103	Engineering Mathematics - II	4			4
R5 -104	Engineering Physics - I	5			5
R5 -105	Engineering Chemistry - I	5			5
R5 -106	Engineering Graphics - I		5		5
R5 -107	Engineering Physics Practical - I			2	2
R5 -108	Engineering Chemistry Practical - I			2	2
R5 -109	Workshop Practice - I			3	3
	TOTAL	23	5	7	35

SECOND SEMESTER

SUB. CODE	SUBJECT	HOURS PER WEEK			
		Theory	Tutorial / Drawing	Practical	Total
R5 -201	Communication English - II	5			5
R5 -202	Engineering Mathematics - III	5			5
R5 -203	Applied Mathematics	5			5
R5 -204	Engineering Physics - II	4			4
R5 -205	Engineering Chemistry - II	4			4
R5 -206	Engineering Graphics - II		5		5
R5 -207	Engineering Physics Practical - II			2	2
R5 -208	Engineering Chemistry Practical - II			2	2
R5 -209	Workshop Practice - II			3	3
	TOTAL	23	5	7	35

SCHEME OF EXAMINATIONS

Subject Code	Name of Subject	Periods Per Week	Periods per Semester	Scheme of Examination				
				Exam Duration in Hrs	Allocation of Marks			Minimum for Pass
					Internal	External	Total	
FIRST SEMESTER								
R5 -101	Communication English - I	5	75	3	25	75	100	40
R5 -102	Engineering Mathematics - I	4	60	3	25	75	100	40
R5 -103	Engineering Mathematics - II	4	60	3	25	75	100	40
R5 -104	Engineering Physics - I	5	75	3	25	75	100	40
R5 -105	Engineering Chemistry - I	5	75	3	25	75	100	40
R5 -106	Engineering Graphics - I	5	75	3	25	75	100	40
R5 -107	Engineering Physics Practical - I	2	30	3	25	75	100	50
R5 -108	Engineering Chemistry Practical - I	2	30	3	25	75	100	50
R5 -109	Workshop Practice - I	3	45	3	25	75	100	50
TOTAL		--	--	--	225	675	900	--

SECOND SEMESTER

Subject Code	Name of Subject	Periods Per Week	Periods per Semester	Scheme of Examination				
				Exam Duration in Hrs	Allocation of Marks			Minimum for Pass
					Internal	External	Total	
R5 -201	Communication English - II	5	75	3	25	75	100	40
R5 -202	Engineering Mathematics - III	5	75	3	25	75	100	40
R5 -203	Applied Mathematics	5	75	3	25	75	100	40
R5 -204	Engineering Physics - II	4	60	3	25	75	100	40
R5 -205	Engineering Chemistry - II	4	60	3	25	75	100	40
R5 -206	Engineering Graphics – II (C & M) (Manual Drawing)	5	75	3	25	75	100	40
R5 -206	Engineering Graphics – II (E & IT) (Computer Aided Drawing Practical)	5	75	3	25	75	100	50
R5 -207	Engineering Physics Practical - II	2	30	3	25	75	100	50
R5 -208	Engineering Chemistry Practical - II	2	30	3	25	75	100	50
R5 -209	Workshop Practice - II	3	45	3	25	75	100	50
TOTAL		--	--	--	225	675	900	--

R5-SCHEME GENERAL EVALUATION PATTERN (THEORY)

External Examination	-	75 marks
Internal Assessment	-	25 marks
Total	-	100 marks

Condition for pass:

1. In external exam minimum **30** out of **75** marks
2. In internal there is **no** minimum
3. Internal + external must be **40** percent for pass.

Evaluation of internal assessment marks:

Attendance*	-	05 marks
Assignments	-	10 marks
Continuous Assessment Tests	-	05 marks
Model Examination	-	05 marks
Total	-	25 marks

The internal Assessment marks which are to be distributed as follows:

I) Subject Attendance - 5 Marks

(Award of marks for subject attendance to each subject Theory / Practical will be as per the range given below)

80%	-	83%	}	1 Mark
84%	-	87%	}	2 Marks
88%	-	91%		3 Marks
92%	-	95%		4 Marks
96%	-	100%		5 Marks

II) Test - 10 Marks

Two continuous assessment tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to 5 Marks

The test – III is to be the Model Examination covering all the five units of 3 hours duration for a total of 75 marks are to be conducted. The marks obtained will be reduced to 5 Marks

Total: 10 Marks

III) Assignment - 10 Marks

For each theory subject, three assignments are to be given and the average marks scored should be reduced for 10 marks.

R5-SCHEME GENERAL EVALUATION PATTERN (PRACTICAL)

External Examination	-	75 marks
Internal Assessment	-	25 marks
		100 marks
Total	-	100 marks

Condition for pass:

1. In external practical exam minimum **35** out of **75** marks
2. In internal there is **no** minimum
3. Internal + external must be **50** percent for pass.

Evaluation of internal mark:

The internal Assessment mark for a total of 25 marks which are to be distributed as follows:-

a) Attendance	: 05 Marks (same as theory subjects)
b) Procedure / observation and tabulation / other Practical related works	: 10 Marks
c) Record Writing	: 10 Marks
Total	: 25 Marks

Note:

- All the Experiments / Exercise indicated in the syllabus should be completed and the same to be given for final Autonomous end semester examinations.
- The Record/file for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocations.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark. (20+5=25 Marks).
- The Students have to submit the duly signed bonafide record note book/file during the Practical examinations.
- All the marks awarded for assignments, Tests and attendance should be entered in the Personal Log Book of the staff, who is handling the subjects. This is applicable to both Theory and Practical Subjects.

Classification of successful candidates (Award of Class):

Classification of candidates who will pass out the final examinations from April 2019 onwards (Joined in first year in 2016-2017) in R5-scheme is being done as specified below:

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction**, if he secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction**, if he secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study of 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

First Class:

A candidate will be declared to have passed in **First Class**, if he secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 3 / 2 years (3 years for regular entry / 2 years for lateral entry) without any break.

Second Class:

All other successful candidates will be declared to have passed in **Second Class**.

DETAILED SYLLABUS
FIRST SEMESTER
R5-101 COMMUNICATION ENGLISH – I
 (Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-101 COMMUNICATION ENGLISH – I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

Topics and Allocation of Hours:

S. No.	Section	No. of Hours
1	Part - I Grammar	36
2	Part - II Composition & Comprehension	30
3	Tests (CAT I, II & Model)	7
4	Revision	2
	TOTAL	75

DETAILED CONTENTS:

S.No	Subject	How to go about	Expectations	Hrs
1	PRONUNCIATION	Learning phonetic symbols – examples - words with different sounds.	No matter what language a person speaks but he is expected to render justice to a language with the use of proper pronunciation. A language is structured with sentences and sentences with words and words with sound. We, in this part, give exercises to students to pronounce the ODD words and to differentiate between short and long vowels.	3
2	HOMOPHONES	Variety of homophones – collections.	The study of Homophones help students come out with confidence in writing.	2
3	NUMBER	Error removing in words and sentences.	The Regular and Irregular plurals are taught to understand the number better. This teaching nullifies the common errors committed by students.	2
4	THE VERB	Through four structures - sentences connecting the SUBJECT with the VERB.	The teaching of the VERB helps students know the proper usage of it. The VERB and its relation with 1. Time 2. Person 3. Number 4. Infinitive 5. Gerund 6. Participle.	3
5	TENSE	Re-doing the 4	The tense is one of the qualities	3

		structures sentences - Study of the VERB and the AUXILIARY.	of the verb. The tense is taught here along with 4 structures, Simple, continuous, perfect, continuous.	
6.	ADJECTIVES	Study of the ADJECTIVES – the Comparison and Error removing.	Adjectives actually decorate the Nouns - the use of Adjectives enhances the Quality of Speech and it makes the process of understanding easier.	2
7	PREPOSITION	Study of all PREPOSITIONS -Error removing - where to use and where not to use - exercises.	The study of the preposition helps the students reduce the length of a sentence - A time - saver	2
8	ARTICLES	Where to use and where not to use the Article- Exercises.	The Articles A AN THE and SOME are really under the broadness of the Adjective.	2
9	SPELLING	Teaching the Syllable- differentiating the I from the E – the silence of the letters.	English is a tricky language. The spelling of words often let down the students. The sound often differs from the spelling. A beginner always goes by sound. A proper training in this area will largely minimize the mistakes committed by the polytechnic level students.	2
10	THE CLAUSE	Activities – practice on use of clause - Examples.	The study of the clause enables the students to insert many ideas into single sentences. The beginner, now here, learns to write one subordinate clause and one main clause in a single sentence.	3
11	FRAMING QUESTIONS	The WH and the Auxiliary verb + Subject.	Questioning is part of life. A speaker of the English language should have understood the questioning well. The study of the sentence patterns helps understand it properly.	2
12	TRANSFORMATION OF SENTENCES	Practical examples of life.	The Transformation of sentences from one category to another – from Statement to Exclamatory and from Statement to Interrogative – helps students speak in change of moods. A proper practice in this section of study will make students fluent.	3
13	PUNCTUATION	Study of all the	Pauses are very important for	2

		punctuation marks and their uses.	proper understanding in spoken English. The full stop and the comma justify this. The other punctuation marks largely contribute to the written English.	
14	RE-ARRANGING THE JUMBLED WORDS	The nature of sentences and what they imply.	The four types of sentences – Assertive, Interrogative, Imperative and Exclamatory – are learnt with exercises. The grasping power of the students is enhanced. Students, normally, do not know to start a sentence. The beginning of a sentence finds way here. The students get to know the technique and become fast in the approach of starting a sentence.	2
15	GIVING DIRECTIONAL INSTRUCTIONS	Imperative	The executive nature helps students to give directional instructions. This directional training gives a student an authority in speaking.	2
16	COMPREHENSION	Reading and Understanding	The old practice of learning English is comprehension and it still holds water. We will continue to include comprehension in English study because it properly guides the students to comprehend and answer. This exercise enables the students to excel in Listening Comprehension at a later stage.	3
17.	TECHNICAL DEFINITIONS	Identifying objects in and around	This exercise makes students come out with description of something which they know about. They practice to make technical definitions.	4
18	PERSONAL LETTERS	Controlled and directed.	The loose sally of writing of students is controlled and the students are trained to write effectively with thought content, eventhough these are informal letters.	3
19	NAMING WORDS	Identifying the Nouns	This exercise trains the students to understand the names which occur in sentences, especially, in a particular place and situation.	2
20	SHORT MESSAGES	Spot write words – minimize.	This exercise is a timesaver - the students are trained here to write short messages for a particular idea to be delivered to someone.	2
21	VISUALS	Start with the	This exercise helps the students	4

		subject and the verb.	become fluent in describing a visual. A picture or a graphic is converted by the students into words of sentences.	
22	LINKERS/CONNECTORS (likewise - on the other hand)	Minimize numerous sentence – reduce words.	A proper study of linkers and sentence connectors will help the students to express their ideas vividly. This exercise gives the students the numerous connectors so as to enable them to write and speak the English language with passing of ideas clearly.	2
23	GRAPHICS	Identifying the subject and connecting it with the verb.	Here the student is trained to trans code the graphics viz. Pie-chart, Bar chart, Tabular columns, Graph etc.,.	3
24	HINTS DEVELOPMENT	Activity – using vocabulary and the functional units.	This exercise helps students be bold in life’s encounters as they are trained to expand hints to connect various walks of life.	3
25	ONE WORD SUBSTITUTION	Collection of words that substitute long phrases and clauses.	This is a time saver. The study of words which mean something with multiplied words helps students shorten writing and speaking but at the same time to mean a lot.	3
26	NOTE-MAKING	Task – note important information – where to avoid grammar	This is the opposite of the previous exercise, Hints Development. A student who attends a conference, a discourse, or a seminar or watches a television show finds it easier when he knows the art of collecting information with proper hints.	2

Instruction Hours	66 Hrs
Continuous Assessment Tests I & II & Model Exam	07 Hrs
Revision	02 Hrs
Total	75 Hrs

QUESTION PAPER PATTERN

Time: 3 Hours

Max: Marks: 75

Part- A (Grammar-30 Marks)

1. Out of 12 questions given, 10 questions should be answered. Each question carries 3 Marks.

Part – B /section-I (Composition and Comprehension -24 Marks)

2. Out of 11 questions given, 6 questions should be answered .The first 5 questions are “either – or” type. The sixth question is a compulsory question.

Part – B /section-II (Composition and Comprehension -21 Marks)

3. Out of 6 questions given, 3 questions should be answered. All the 3 question are “either – or” type. Each question carries 7 Marks.

R5-102 ENGINEERING MATHEMATICS – I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hours /Week	Hours /Semester	Marks			
R5-102 ENGINEERING MATHEMATICS – I	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

OBJECTIVE: The objective is to illustrate the concept & formulae to the diploma students. The wide applications of Mathematics in the field of Engineering are also dealt with.

UNIT - I

10 Hours

MATRICES AND DETERMINANTS

Chapter - 1.1 MATRICES

Definition of a matrix - order of a matrix - types of a matrix - transpose of a matrix - scalar multiplication of a matrix - matrix addition - matrix subtraction - matrix multiplication.

Chapter - 1.2 DETERMINANTS

Definition of a determinant - expansion of determinants of order 2 and 3.

Solution of simultaneous equations using Cramer's rule (in 2 and 3 unknowns) - Simple Problems.

Chapter-1.3 INVERSE AND RANK OF A MATRIX

Definition – Singular Matrix, Non-singular Matrix, Adjoint of a matrix.

Finding the Inverse of a matrix up to 3x3 only - simple problems.

Definition – Rank of a matrix - Finding rank of a matrix by determinant method (matrix of order 3x4) - simple problems.

UNIT - II

10 Hours

BINOMIALTHEOREM AND PARTIAL FRACTIONS

Chapter - 2.1 BINOMIALTHEOREM AND PARTIAL FRACTIONS

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 the general term and middle term - simple problems.

Chapter - 2.2

Finding coefficient of x^n and term independent of x . Simple Problems. Binomial Theorem for rational index upto -3 (statement only) Expansions only for -1, -2 and -3.

Chapter - 2.3 PARTIAL FRACTIONS

Definition of polynomial fraction, proper and improper fractions and definition of partial fractions. To resolve proper fraction into fraction with denominator containing non repeated linear factors, repeated linear factors - Simple Problems.

UNIT - III

10 Hours

TRIGONOMETRY – I

Chapter - 3.1 COMPOUND ANGLES

Concept of quadrants – (Basics only). Expansion of $\sin(A \pm B)$, $\cos(A \pm B)$ and $\tan(A \pm B)$ [without proof]. Problems using above expansions.

Chapter - 3.2 MULTIPLE ANGLES

Trigonometrically ratios of multiple angles of 2A and 3A - Simple Problems.

Chapter - 3.3 SUM AND PRODUCT FORMULA

Sum and product formulae (without proof) - simple problems

UNIT - IV

10 Hours

TRIGONOMETRY- II

Chapter - 4.1 PRODUCT AND SUM FORMULA

Product and sum formulae (without proof) - simple problems.

Chapter - 4.2 INVERSE TRIGONOMETRICAL FUNCTIONS

Definition of inverse trigonometric ratios – Relation between inverse trigonometric ratios. Simple Problems.

Chapter - 4.3 TRIGONOMETRICAL EQUATIONS

General solutions of $\sin\theta = k, \cos\theta = k, \tan\theta = k$ Principle solutions - solving equations of the form $a \cos\theta + b \sin\theta = c, \text{ Where } c^2 \leq a^2 + b^2$ - simple problems

UNIT - V

10 Hours

TRIGONOMETRY-III

Chapter - 5.1 PROPERTIES OF TRIANGLES

Sine Formula (without proof) - Napier's formula (without proof) - Cosine formula (without proof) - simple problems.

Chapter - 5.2 PROPERTIES OF TRIANGLES

Projection formula (without proof) - Half angle formula (without proof) - simple problems.

Chapter - 5.3 IN-CIRCLE & IN-RADIUS OF A TRIANGLE

In-Circle and In-radius of a triangle - Ex-circle and Ex-Radius of a triangle (All Results only) - Simple Problems.

Reference Books:

- Mathematics for Higher Secondary –I year and II year (TamilNadu Text Book Corporation)
- Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai
- Engineering Mathematics – Dr.P.Kandasamy & Others ,S.Chand & Co Ltd, New Delhi

Instruction Hours	50 Hours
Continuous Assessment Tests & Model Exam	07 Hours
Tutorials / Revision / Discussion	03 Hours
Total	60 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total	75 marks	

R5-103 ENGINEERING MATHEMATICS – II

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-103 ENGINEERING MATHEMATICS – II	Hours /Week	Hours /Semester	Marks			Duration
	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	3 Hrs

OBJECTIVE: The objective is to illustrate the concept & formulae to the diploma students. The wide applications of Mathematics in the field of Engineering are also dealt with.

UNIT - I 10 Hours

COMPLEX NUMBERS - I

Chapter -1.1

Definition– Real and Imaginary parts, Conjugates, multiplication and division of complex numbers (geometrical proof not needed)

Chapter -1.2

Polar form of a complex number - Modulus and amplitude form - Simple Problems.

Chapter -1.3

Argand Diagram – Collinear points, four points forming square, rectangle, rhombus and parallelogram only - Simple Problems.

UNIT - II 10 Hours

COMPLEX NUMBERS - II

Chapter -2.1 DEMOIVRE'S THEOREM - I

Demoivre's Theorem (statement only) – simple problems.

Chapter -2.2 DEMOIVRE'S THEOREM - II

Demoivre's Theorem – related simple problems.

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.

UNIT - III 10 Hours

DIFFERENTIAL CALCULUS AND LIMIT OF A FUNCTION

Chapter - 3.1 LIMITS

Definition of Limits - Problems using the following results:

$$i) \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}, ii) \lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1, iii) \lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} = 1, (\theta - \text{radians}) \text{ results only- Simple Problems}$$

Chapter - 3.2 DIFFERENTIATION

Definition - Differentiation of $x^n, e^x, \sin x, \cos x, \tan x, \sec x, \operatorname{cosec} x, \cot x, \log x, uv, uvw, \frac{u}{v}$ where

u, v, w are functions of x (results only). Simple problems using the above results.

Chapter – 3.3 DIFFERENTIATION METHODS

Differentiation of function of function (chain rule) - simple problems

UNIT - IV**10 Hours****Chapter – 4.1 DIFFERENTIATION METHODS**

Differentiation of Inverse Trigonometric functions - simple problems.

Chapter – 4.2 DIFFERENTIATION METHODS

Differentiation of simple Implicit functions - simple problems.

Chapter – 4.3 DIFFERENTIATION METHODS

Differentiation of Parametric functions - simple problems.

UNIT - V**10 Hours****DIFFERENTIAL CALCULUS - II****Chapter - 5.1 SUCCESSIVE DIFFERENTIATION**

Successive differentiation up to second order (parametric form not included) - Definition of differential equation - order and degree - simple problems.

Chapter - 5.2 Formation of differential equations - simple problems.**Chapter - 5.3 PARTIAL DIFFERENTIATION**

Definition - partial differentiation of two variables.(upto second order only) simple problems.

Reference Books:

- Mathematics for Higher Secondary – I year and II year (TamilNaduText Book Corporation)
- Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai
- Engineering Mathematics – Dr.P.Kandasamy & Others ,S.Chand & Co Ltd, New Delhi

Instruction Hours	50 Hours
Continuous Assessment Tests & Model Exam	07 Hours
Tutorials / Revision / Discussion	03 Hours
Total	60 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total	75 marks	

R5-104 ENGINEERING PHYSICS – I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-104 ENGINEERING PHYSICS – I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

OBJECTIVES:

At the end of the study of first semester the student will be able to

- Understand the importance of SI units, dimensional formulae and its applications.
- Acquire broad ideas about resultant, moment of force, torque of a couple friction, its uses, linear motion and circular motion and its application.
- Gain knowledge about rotational kinetic energy, angular momentum.
- Understand the concepts of SHM, simple machines and its efficiency.
- Understand the elastic property and the types of Modulus of elasticity.
- Understand the surface tension of liquids and viscosity of fluids and its applications.
- Understand the propagation of sound and acoustics of buildings.
- Explain the importance of hysteresis of magnetic materials and its uses.
- Solve simple problems involving expressions derived in all the above topics.

UNIT – I SI UNITS AND STATICS

1.1 UNITS AND DIMENSIONS

7 Hrs

Unit – Definition – Fundamental Quantities – Definition – Seven fundamental quantities and their SI units and symbol for the units – Dimensional formula for length, mass and time – Supplementary quantities – plane angle and solid angle; their SI units and symbol for the units – Derived physical quantities – Definition – SI units, symbol for the units and derivation of dimensional formula for area, volume, density, velocity, momentum, acceleration, force, impulse, work or energy and power – Conventions to be followed in writing SI units – Multiples & sub multiples of units and their prefixes.

Relation between the physical quantities – Direct and inverse relation – Examples (Relation between the current and voltage in a circuit, Relation between pressure and volume) – Use of Dimensional method to derive the relation between the physical quantities (Period of oscillation of a simple pendulum)

1.2 STATICS

6 Hrs

Scalar and vector quantities – Definitions and examples – Representation of a vector quantity – Resolution of a vector into two mutually perpendicular directions (rectangular components) – Concurrent forces – Definition – Resultant and equilibrant – Definitions – Parallelogram law of forces – statement – Expressions for magnitude and direction of the resultant of two forces acting at a point with an acute angle between them – Lami's theorem – Statement and explanation – Simple problems based on expressions for magnitude and direction of resultant – Moment of a force – Clockwise and anti-clockwise moments – Principle of moments – Couple – Torque acting due to a Couple – Coplanar parallel forces – Law of coplanar parallel forces.

UNIT – II DYNAMICS – I

2.1 FRICTION

3 Hrs

Friction- Definition-Types of friction – Static friction Limiting friction and Dynamic friction – Laws of limiting friction – Coefficient of static friction – Angle of friction – Simple problems – Uses of friction – Methods to reduce friction.

2.2 STRAIGHT LINE MOTION

5 Hrs

Introduction – Distance – Displacement – Speed – Velocity – Uniform velocity – Variable velocity- Acceleration – Uniform acceleration – Acceleration due to gravity – Difference between mass and weight – Newton’s Law of motion – First law (Law of inertia) – Definition of inertia – Definition of force – Definition of momentum – Newton’s second law of motion (Law of momentum) – Expression for force (no derivation) – Definition of impulsive force – Newton’s third law – Fundamental Equations of motion for objects – in horizontal motion – falling freely – thrown vertically upwards. Work, Power and Energy- Potential energy– Kinetic energy – Law of conservation of energy – Simple problems.

2.3 CIRCULAR MOTION

5 Hrs

Circular motion, angular velocity, period and frequency of revolutions – Definitions – Relation between linear velocity and angular velocity – Relation between angular velocity, period and frequency – Normal acceleration, centripetal force and centrifugal force – Definitions – Expressions for normal acceleration and centripetal force (no derivation). Banking of curved paths – Angle of banking – Definition – Expression for the angle of banking of a curved path. $\{ \tan\theta = v^2 / (r g) \}$ Simple problems based on expressions for centripetal force and angle of banking.

UNIT – III DYNAMICS – II

3.1 MOTION ABOUT AN AXIS

5 Hrs

Rigid body – Definition – Moment of inertia of a particle about an axis, moment of inertia of a rigid body about an axis – expressions – Radius of gyration – Definition – Expression for the kinetic energy of a rotating rigid body about an axis – Angular momentum – Definition – Expression for the angular momentum of a rotating rigid body about an axis – Law of conservation of angular momentum – Examples.

3.2 SIMPLE HARMONIC MOTION

4 Hrs

Periodic motion – Oscillatory motion – Simple harmonic motion – Definition – Concept of restoring force – Period – Frequency – Phase – Phase difference – Expression for the displacement, velocity, acceleration and period of a body executing simple harmonic motion (no derivation) – Phase relation between displacement, velocity and acceleration of a body executing simple harmonic motion.

3.3 SIMPLE MACHINES

4 Hrs

Simple machines – Definition – Types of simple machine – Load – Effort – Mechanical advantage – Velocity Ratio – Efficiency and their relation – Screw jack – Expression for Mechanical Advantage – Problems based on MA, VR and Efficiency of Screw jack.

UNIT – IV PROPERTIES OF MATTER

4.1 ELASTICITY

5 Hrs

Elastic and plastic bodies – Definition – stress, strain – Definitions – Hooke’s law – statement – Modulus of elasticity – Young’s modulus – Behaviour of metallic wire under increasing load – Elastic range – Yield point, Breaking point and Breaking stress – Bulk modulus – Rigidity modulus and Poisson’s ratio – Definitions - Limiting value of Poisson’s ratio – Uniform and non – uniform bending of beams – Experimental determination of the Young’s modulus of the material of a beam by uniform bending method. Simple problems based on stress, strain and Young’s modulus.

4.2 VISCOSITY

4 Hrs

Viscosity – Definition – Coefficient of viscosity – Definition, SI unit and dimensional formula – Stream line flow, turbulent flow – Explanation – Critical velocity – Definition – Reynolds number and the determination of nature of flow of liquid in a pipe – Terminal velocity – Definition – Derivation of expression for the coefficient of viscosity of highly viscous liquid by Stoke’s method – Practical applications of viscosity.

4.3 SURFACE TENSION**4 Hrs**

Surface tension – Definition and unit – Angle of contact – Definition – Expression for surface tension of a liquid by capillary rise method – Experimental determination of surface tension of water by capillary rise method – Practical applications of capillarity. Simple problems based on expression for surface tension.

UNIT – V SOUND AND MAGNETISM**5.1 SOUND****6 Hrs**

Source of sound – Audible range – Infrasonic – Ultrasonic waves – Wave motion – Mechanical wave motion – Transverse waves and longitudinal waves and their characteristics and examples – Wave length of sound wave – Frequency of sound wave – Wave velocity – Stationary or standing waves and its characteristics. Vibrations – Free & forced vibrations and resonance – definitions and examples – Laws of transverse vibrations of a stretched string – Sonometer – Experimental determination of frequency of a tuning fork. Simple problems based on wave velocity and frequency of sound wave.

5.2 ACOUSTICS OF BUILDINGS**2 Hrs**

Acoustic requirement of a building – Factors affecting the acoustics of building – Echo – Reverberation, reverberation time, Sabine's formula for reverberation time (no derivation) – Coefficient of absorption of sound energy – Noise pollution.

5.3 MAGNETISM**5 Hrs**

Magnet – Pole strength – Definitions - Coulomb Inverse Square Law in magnetism – Magnetic field – Magnetic lines of forces - Magnetic flux – Magnetic induction – Magnetic Moment of a Magnet – Intensity of Magnetization – Hysteresis – Saturation – Retentivity – Coercivity – Method of drawing hysteresis loop of a specimen using a solenoid - Loss due to Hysteresis – Selection of magnetic materials for permanent and temporary magnets.

Reference Books:

- Fundamental of Physics – Haliday and Resnick 3rd edition
- Engineering Physics – R. K. Gaur and S. L. Gupta
- Engineering Physics – B. L. Theraja
- Physics for Higher Secondary – First & Second year – Volume I & II –TamilNadu Text Book Corporation – 2004 & 2005
- A text book of sound – R.L. Saighal & H.R. Sarna – S.Chand & Co.
- Mechanics – Narayana Kurup – S. Chand Publishers

Instruction Hours	65 Hours
Continuous Assessment Test I, II & Model Exam	07 Hours
Revision / Assignment Discussion	03 Hours
Total	75 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total	75 marks	

R5-105 ENGINEERING CHEMISTRY – I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-105 ENGINEERING CHEMISTRY – I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

RATIONALE:

The subject Engineering Chemistry creates foundation for understanding basic concepts of chemistry and its effects on Engineering Materials. Engineering Chemistry also impart knowledge of properties of materials and protecting them from corrosion and selecting right types of materials used in various fields of Engineering and Industry.

OBJECTIVES:

The objective of this course is to make the student to

- Study about the importance of Engineering Chemistry in industry.
- Know about atomic structure, molecular mass and acids and bases.
- Learn about solutions, colloidal particles and nano -particles.
- Know about hardness of water, catalysis and glass.
- Explain the details of electrochemistry, electrochemical cell and energy sources .
- Understand corrosion and its preventive methods.

UNIT-I NUCLEAR CHEMISTRY, ACIDS AND BASES

1.1 Nuclear chemistry

7 Hrs

Nucleus–Nuclear properties–Mass defect and binding energy (no numerical problems) – Isotopes, Isobars and Isotones – Natural radio activity – definition – Alpha, beta, gamma rays – Comparison of alpha, beta, gamma particles – definition – examples – Radioactive decay – Alpha and beta decay with example – group displacement law – Radioactive decay law – half life period – definition – kinetics of half life period – simple numerical problems – Nuclear fusion and Nuclear fission – definition – Fission of U235 – Fusion reaction in the SUN – artificial radioactivity – definition – example – artificial transmutation of elements –Nuclear reactors – definition of nuclear reactor – reactor core – reflector, pressure vessel, shielding, heat exchanger and turbine – application of radioactive isotopes

1.2 Acids and Bases

5 Hrs

Theories of Acids and bases – Arrhenius Theory – Lowry-Bronsted Theory – Lewis theory – Advantages of Lewis theory – pH and pOH – Definition – Numerical problems – Indicator – Definition – Buffer solution–Definition– Types of buffer solution with examples – Application of pH in industries.

UNIT – II SOLUTION, COLLOIDS, NANO-PARTICLES

2.1 Solution

4 Hrs

Definition – Methods of expressing concentration of a solution – Molarity, Molality, Normality, Mole fraction and Percent age Mass – Simple problems.

2.2 Colloids

6 Hrs

True solution and Colloidal solution – Definition – Differences – Types of Colloids – Lyophilic and Lyophobic colloids – Differences – Properties – Tyndall effect, Brownian movement, Electrophoresis and Coagulation – Industrial applications of colloids – Smoke Precipitation by Cottrell's method, Purification of water, Cleansing action of soap, Tanning of leather and Sewage disposal.

2.3 Nano-Particles

3 Hrs

Definition – Importance of Nano-particles – Area of application – Medicine, Electronics and Biomaterials.

UNIT – III TECHNOLOGY OF WATER, CATALYSIS AND GLASS

3.1 Technology of Water

7 Hrs

Sources of water – Reasons for depletion of underground water – Rain water Harvesting (Basic ideas) – Advantages – Hard water and soft water – Hardness of water – Carbonate and Non-carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Simple problems – Softening of hard water – Ion-Exchange method and Reverse Osmosis method – Municipal water supply – Purification (Sedimentation, Filtration and Sterilization) – Disadvantages of using hard water in boilers – Scale formation, Corrosion of boiler metal, Caustic Embrittlement and Priming and Foaming.

3.2 Catalysis

4 Hrs

Catalyst – Positive catalyst – Negative catalyst – Definition – Types of catalysis – Homogeneous and Heterogeneous – Promoter – Catalyst poison – Definition – Characteristics of a catalyst – Industrial applications of catalysts.

3.3 Glass

3 Hrs

Definition – Manufacture of glass – Varieties of Glass – Optical glass, Wind shield glass and Photo chromatic glass.

UNIT – IV ELECTROCHEMISTRY, ELECTROCHEMICAL CELL, ENERGY SOURCES

4.1 Electrochemistry

5 Hrs

Electrolyte – Definition – Strong and Weak electrolytes – Examples – Electrolysis – Definition – Mechanism – Industrial application of Electrolysis – Electroplating – Preparation of surface – Process – Factors affecting the stability of the coating – Chrome plating – Electroless plating – Definition – Advantages of Electroless plating over electroplating – Applications of Electroless plating .

4.2 Electrochemical Cell

4 Hrs

Electrochemical Cell – Definition – Representation of a Cell – Single Electrode Potential – Definition – Galvanic Cell – Formation of Daniel Cell – Electrochemical Series – Definition and Significance – Electrolytic Concentration Cell – Definition and Formation.

4.3 Energy Sources

4 Hrs

Primary Battery – Definition and example – Construction, Working and Uses of Dry cell
Secondary Battery – Definition and example – Construction, Working and Uses of Lead - acid Storage Cell – Non-conventional Energy Sources – Solar Cell – Definition – Principle, Construction, Working and Uses.

UNIT – V CORROSION, METHODS OF PREVENTION OF CORROSION, ORGANIC COATINGS

5.1 Corrosion

4 Hrs

Definition – Types of Corrosion – Theories of corrosion – Galvanic Cell Formation Theory – Differential Aeration theory – Factors influencing the rate of corrosion.

5.2 Methods of Prevention of Corrosion

4 Hrs

Control of Environment – Alloying – Surface coatings – Metal coatings – Electroplating, Galvanization and Tinning – Inorganic coating – Anodizing – Cathodic Protection – Sacrificial Anode Method and Impressed Voltage Method.

5.3 Organic Coatings

5 Hrs

Paint – Definition – Components of Paints and their functions – Varnish – Definition – Preparation of Oil Varnish – Differences between Paint and Varnish – Special Paints – Luminescent Paints, Fire retardant Paints, Aluminium Paints and Distemper.

Reference Books:

- Engineering Chemistry – Jain & Jain – Dhanpat Rai & Sons.
- A Text Book of Engineering Chemistry – S. S. Dara – S. Chand Publication
- A Text Book of Environmental Chemistry and Pollution Control S. S. Dara – S. Chand
- Engineering Chemistry – Uppal – Khanna Publishers
- Chemistry – Higher Secondary Second Year – Volume I & II – Tamil Nadu Text Book Corporation – 2014.
- Environmental Chemistry – V P Kudesia – Pragati Publishers.

Instruction Hours	65 Hours
Continuous Assessment Test I, II & Model Exam	07 Hours
Revision / Assignment Discussion	03 Hours
Total	75 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total	75 marks	

R5-106 ENGINEERING GRAPHICS - I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hours/Week	Hours/Semester	Marks			
R5-106 ENGINEERING GRAPHICS - I	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

MANUAL DRAWING

Objectives

- Manual drawing
- In V unit, Theoretical approach to introduction to Computer Aided Design is given.

MAJOR DIVISIONS:

- Introduction to Engineering Drawing & Dimensioning
- Geometric Construction, Constructions of conics
- Projection of Points & straight lines
- Orthographic Projection
- Introduction to Computer Aided Design (CAD)

Unit	R5 – Engineering Graphics-I	Hours
I	<p>1.1 Drawing office practice Importance of engineering drawing - drawing instruments: drawing board, mini drafter, compass, divider, protractor, drawing sheets, drawing pencils, set squares etc., - title block – folding of drawing sheets. Importance of legible lettering and numbering - single stroke letters - upper case and lower case letters- general procedures for lettering and numbering - height of letters – guidelines- practices. Scales - full scale, reduced scale and enlarged scale.</p> <p>1.2. Dimensioning Dimensioning – terms and notations as per BIS -requirement of dimensioning - Dimension line, Extension lines and Leader lines – Dimensioning systems - Methods of dimensioning – Important dimensioning rules – Exercises (One view of the object).</p>	12
II	<p>2.1 Geometric Constructions Geometric constructions: Bisect a line – bisect an arc – bisect given angle – divide straight line into number of equal parts – divide the circle into number of equal divisions – draw an arc touching two lines at any angle – draw an arc touching two arcs.</p> <p>2.2 Constructions of conics Conics: Cone – conic sections - Definition of locus, focus, directrix, axis, vertex and eccentricity. Definition: ellipse, parabola and hyperbola. Ellipse: Construction of ellipse by concentric circle method, rectangular method and Eccentricity method when focus and directrix are given – Exercises in practical applications. Parabola: Construction of parabola by rectangular method, parallelogram method and eccentricity method when focus and directrix</p>	17

	are given– exercises in practical applications. Hyperbola: Construction of hyperbola by rectangular method and eccentricity method when focus and directrix are given– exercises in practical applications.	
III	3.1 Projection of points. Projection of points – points on the different quadrants and on the reference planes. 3.2 Projection of straight lines. Projection of straight lines – Line on the first quadrant and on the reference planes - perpendicular to one plane and parallel to other plane – inclined to one plane and parallel to the other plane – parallel to both the planes – inclined to both the planes – Exercises	13
IV	4.1. Orthographic projection Introduction – Orthographic projection - terms - First angle projection - Third angle projection – Draw symbols – Compare first and third angle projections. Draw the projections of the simple isometric objects using first angle projection only – Draw front view, top view and right/left side view.	19
V	5.1 Introduction to Computer Aided Design (CAD), (Theoretical approach only) Need, requirements and advantages of CAD –line, circle, arc, polygon, ellipse, rectangle- erase and other editing commands – difference between conventional drawing and computer aided drawing, CAD Tools, Drafting and Unit settings,	4

Instruction Hours	65 Hours
Continuous Assessment Test I, II & Model Exam	07 Hours
Revision / Assignment / Discussion	03 Hours
Total	75 Hours

QUESTION PAPER PATTERN

Answer all the questions in the drawing sheet only.

1. One question from Lettering and one question from dimensioning - 20 marks
2. One question from bisect line or arc and one question from construction of conics (Ellipse, Parabola and Hyperbola) -15 Marks
3. Projection of points or straight lines. -10 Marks
4. One question from orthographic projection (Draw 3 views in first angle projection) - 30 Marks

R5-107 ENGINEERING PHYSICS PRACTICAL – I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	External Exam	Total	
R5-107 ENGINEERING PHYSICS PRACTICAL – I	2 Hrs	30 Hrs	25	75	100	3 Hrs

LIST OF EXPERIMENTS WITH OBJECTIVES:

- Screw gauge:** Measurement of thickness of wire, thickness of glass plate and area of glass plate by using graph sheet and to calculate the volume of the glass plate.
- Vernier caliper:** To determine the volume of the hollow cylinder.
- Concurrent forces:** To verify parallelogram law of forces and Lami's theorem.
- Simple pendulum:** To determine the acceleration due to gravity of the place.
- Co-efficient of Viscosity of highly viscous liquid:** Stoke's method
- Surface tension of water:** Capillary rise method
- Sonometer:** To determine the frequency of the given tuning fork.
- Deflection magnetometer:** tan A position – Comparison of magnetic moments of bar magnets by equal distance method.

Theory & Instruction classes	08 Hours
Experiments 8 x 2	16 Hours
Revision / Repetition	04 Hours
Internal Practical Examination	02 Hours
Total	30 Hours

QUESTION PAPER PATTERN

Answer any one of the above experiment chosen by random method. The marks will be awarded as per the scheme of valuation.

SCHEME OF VALUATION

S. NO	CATEGORY	MARKS
1	Formula with explanation	10
2	Figure / Circuit	05
3	Tabulation	10
4	Observation	35
5	Calculation	10
6	Result	05
	Total	75

R5-108 ENGINEERING CHEMISTRY PRACTICAL – I

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-108 ENGINEERING CHEMISTRY PRACTICAL – I	2 Hrs	30 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

OBJECTIVES:

1. At the end of the program the student will have knowledge about volumetric analysis in acidimetric, alkali metric and permanganometric titrations and their applications.
2. To give knowledge of estimation of total hardness of water.
3. To get the knowledge about measurement of p^H and to calculate hydrogen ion concentration in a solution.

VOLUMETRIC ANALYSIS

ACIDIMETRY AND ALKALIMETRY:

1. Estimation of Sulphuric acid, using a standard solution of hydrochloric acid and NaOH as link solution – Phenolphthalein indicator.
2. Estimation of sodium hydroxide using a standard solution of sodium carbonate using sulphuric acid as link solution – Methyl orange indicator.
3. Comparison of strengths of two sulphuric acid solutions using a link solution of NaOH – Phenolphthalein indicator.
4. Comparison of strengths of two sodium hydroxide solutions using sulphuric acid as a link solution.

PERMANGANOMETRY:

5. Determination of p^H using a p^H -meter and determination of hydrogen ions concentration (H^+) by calculation method (5 samples to be given)
6. Estimation of Mohr's salt solution using standard solution of ferrous sulphate and link solution of potassium permanganate.
7. Estimation of ferrous sulphate using standard solution of Mohr's salt solution and link solution of potassium permanganate.
8. Comparison of two Mohr's salt solutions with a link solution of Potassium permanganate.
9. Comparison of two ferrous sulphate solutions with a link solution of Potassium permanganate.
10. Comparison of two Potassium permanganate solutions with a link solution of ferrous sulphate.

Instruction Hours	06 Hours
Experiments 10 x 2	20 Hours
Revision / Repetition	04 Hours
Total	30 Hours

SCHEME OF EVALUATION**VOLUMETRIC ANALYSIS:**

DESCRIPTION	MARKS ALLOTTED
Short procedure	05
Viva – voce	05
Titration – I	25
Titration – II	25
Calculations (3 x 5) (titration - I, titration - II & calculations) (for arithmetic errors 25% marks may be reduced)	15
TOTAL	75

DETERMINATION OF pH:

DESCRIPTION	MARKS ALLOTTED
Answer for short questions on pH	05
Viva – Voce	05
Determination of pH (5 samples) (5 x 8)	40
Calculation of $[H^+]$ (5 x 5)	25
TOTAL	75

MODEL QUESTION PAPER**MODEL 1:****3 Hours**

Estimation of the given ferrous sulphate solution using a standard solution of ferrous ammonium sulphate of strength 0.0972N and an approximately decinormal solution of potassium permanganate.

MODEL 2:**3 Hours**

Calculate the total hardness of the given sample of water using a standard hard water solution of molarity 0.01M and an approximately decimolar solution of EDTA.

MODEL 3:**3 Hours**

Determine the pH of five given samples using pH meter and calculate the hydrogen ion concentration of the samples.

R5-109C WORKSHOP PRACTICE – I (For DCE)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-109C WORKSHOP PRACTICE – I	Hours / Week	Hours / Semester	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	3 Hrs

I. BASICS OF CONSTRUCTION ENGINEERING PRACTICE

1. Planning & check up Introduction to safety in construction.
2. Study of masonry construction tools.
3. Importance of Bonds in masonry, major classifications of Bonds-English bond-Flemish bond-Stretcher bond Header bond.
4. Demonstration for the exercises.

Exercises:

18 Hours

1. Measuring the Area of the given Building and measuring the volume of the given items in the existing Building Using Measuring Tape.
2. Arrangement of bricks using English bond in one brick thick wall and one brick thick wall for right angled corner junction.
3. Arrangement of bricks using English bond in one brick thick wall, one and half brick thick wall for Tee-junction.
4. Arrangement bricks using English bond in one brick thick square pillars, one and half brick thick pillars.
5. Arrangement bricks using English bond in one brick thick square pillars, one and half brick thick pillars.
6. Arrangement bricks using Flemish bond in half brick wall and two brick thick square pillars.

II. WELDING WORKSHOP

Arc Welding

Electric arc – manual metal arc welding - welding circuit - striking the arc - the point of highest resistance - arc length welding machines - necessity for welding machines - design of welding machines - types of current - welding transformer -controlling output of transformer - cooling the transformer - rectifiers - inverter power source - machine rating - polarity - AC/DC arc welding voltage - arc welding procedure.

Exercises (Batch wise):

12 Hours

1. Lap - joint
2. Butt - joint
3. 'T'- joint
4. 'L'- joint

III. FITTING

1. General safety precaution inside the workshop.
2. Study about first aid.
3. Study of hand tools
4. Study of instruments- Calipers -Scale – Vernier caliper – Vernier height gauge.
5. Marking and punching practice.
6. Hacksaw cutting practice.
7. Filing and fitting practice.
8. Drilling and tapping practice.

Exercises (Batch wise)

12 Hrs

1. Single piece cutting and filing
2. L-Joint
3. V-Joint
4. Drilling and tapping (Four drills and Two with Taps)

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Construction Engineering Practice Exercise	-	35 marks
Welding or Fitting (Any one) Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

R5-109M WORKSHOP PRACTICE – I (For DME)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-109M WORKSHOP PRACTICE – I	Hours / Week	Hours / Semester	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	
					25	75

RATIONALE:

This subject Workshop practice is aimed at providing basic understanding of the fundamentals of practical sections; mainly planning, marking, cutting, filing, wiring connections, standards & conventions of wiring, the tools, the use of measuring instruments in engineering applications and carpentry tools and practices. The subject is planned to include sufficient practices which would help the student to understand the principles of manufacturing.

OBJECTIVES:

At the end of the practice, the students will be able to,

- Acquire skills in basic engineering practice.
- Identify the hand tools and instruments.
- Study and use measuring instruments.
- Practical skills in the fitting, wiring and carpentry trades.

I. FITTING

18 Hours

Introduction:

1. General safety precaution inside the workshop and study about first aid.
2. Study of hand tools and instruments like scale, vernier caliper, gauges etc.,.
3. Marking and punching practice.
4. Hacksaw cutting practice.
5. Filing and fitting to dimensions practice.
6. Drilling and tapping practice.
7. Fitting of female and male joints

Exercises:

1. Fitting to square
2. 'V' Mating
3. 'T' Mating
4. 'L' and square Mating
5. Dovetail Mating
6. Drilling & Tapping

Raw material: Use 3 mm thick MS flat. For Drilling & Tapping exercise use 10mm MS flat.

II. WIRING**12 Hours****Introduction:**

- Introduction to safety in wiring
- Introduction and study of hand tools and power tools
- Identify the types of standard wires and colour codes
- Study about the purpose of earthing
- Identify different electrical fitting and accessories with types.
- Identify the symbols in circuit diagram using BIS symbols
- Fault tracing, Uses of multimeter and diagnose a circuit

Exercises:

1. Control of one lamp by one switch
2. Wire a florescent lamp circuit controlled by a switch
3. Two lamps controlled by one-way switch in series and parallel
4. Dim and Bright wiring practice
5. Do wiring for two lamps independently controlled by two switches
6. Staircase wiring

III. CARPENTRY**12 Hours****Introduction:**

- Introduction to hand tools and wood working machines
- Study about the types of joints
- Identify the wood categories and grain structure
- Handsaw cutting & chisel cutting practice

Exercises:

1. Planning & check up
2. Half lap joint
3. Mortise and Tenon joint
4. Dovetail joint

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Fitting Exercise	-	35 marks
Wiring or Carpentry (Any one) Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

R5-109EI WORKSHOP PRACTICE – I (For DEEE & DIT)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-109EI WORKSHOP PRACTICE – I	Hours / Week	Hours / Semester	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	
					25	75

RATIONALE:

Workshop practice I is aimed at providing basic understanding of the fundamentals of practical sections; mainly planning, marking, cutting, filing, and plumbing and carpentry practices. The subject is planned to include sufficient practices which would help the student to understand the principles of manufacturing.

OBJECTIVES:

At the end of the practice, the students will be able to,

- Acquire skills in basic engineering practice.
- Identify the hand tools and instruments.
- Practical skills in the fitting, plumbing and Carpentry trades.

FITTING

18 hours

1. Study about the
 - a) General safety precaution inside the workshop
 - b) First aid
 - b) Hand tools and instruments- Calipers-Scale-Vernier caliper-Vernier height gauge
2. Single piece cutting and filing
3. V-Mating
4. T-Mating
5. L-Mating

PLUMBING

12 hours

1. Study of plumbing.
2. Install a sink/washbasin and tap using different PVC pipe accessories such as bend, tee, socket and valve.
3. Cutting, bending and external threading of GI/PVC pipes using Die.
4. Repair a leaking water tap and fix water meter.

CARPENTARY

12 hours

1. a) Introduction to hand tools and wood working machine. b) Types of joint
2. Planning and Check-up
3. Half lap joint
4. Middle Lap joint

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Plumbing Exercise	-	35 marks
Fitting or Carpentry (Any one) Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

SECOND SEMESTER

R5-201 COMMUNICATION ENGLISH – II (Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-201 COMMUNICATION ENGLISH – II	Hours / Week	Hours / Semester	Marks			Duration
	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	3 Hrs

Topics and Allocation of Hours:

S. No.	Section	No. of Hours
1	Part - I Grammar	36
2	Part - II Composition & Comprehension	30
3	Tests (CAT I, II & Model)	7
4	Revision	2
TOTAL		75

DETAILED CONTENTS:

S.No	Subject	How to go about	Expectations	Hrs
1	WORDS RELATING TO A PLACE	Demanding students to come out with words – Interaction.	Use of appropriate words – Time saving.	2
2	SYNONYMS & ANTONYMS	Teaching the most appropriate and the opposite words.	Fluency is achieved as the students are trained to speak words changing them into their opposite and similar meaning as the situation demand	2
3	CONVERSION OF VERBS INTO NOUNS AND ADJECTIVES & NOUNS INTO VERBS	Collecting and supplying students with as much words as possible to do exercises.	Fluency is enhanced. Confidence is boosted. - Time saver.	3
4	COMPARISON OF THE ADJECTIVES	The Qualities of a Noun or Pronoun are mentioned in 3 forms , Positive, Comparative , and Superlative.	Students compare the Nouns and express the values of them.	3
5	AFFIXES	Exercises and Tasks - Collection of words from news papers and magazines.	Using opposite words becomes easier and students become eloquent.	3
6.	PASSIVE VERBS	Teaching of 4 structural sentences - Forms of verbs - the Transitive and the Intransitive – Modal	Students become well-versed in Writing –Writing of official letters becomes easier.	3

		Verbs		
7	PREPOSITIONS & ARTICLES	Removing of usual mistakes – Exercises and Tasks - Differences between Native language and English.	Appropriateness in Execution becomes handy.	3
8	VERBAL QUESTIONS	Proper teaching of the Interrogative. Yes/No Questions - Auxiliary verbs.	Language learning - Quick to render minimum worded answer with Yes/No.	3
9	VOICE	Teaching of the Voice – Revision of the Transitive and Intransitive verbs and BE+ Past participle – Intensive drills not to change message of the sentence while transforming into the other voice.	Learning to write Official Letters - Importance of a phrase or a clause.	4
10	CONVERSION - DIALOGUE INTO REPORTED SPEECH.	Drills & Exercises.	Reporting is made possible –Proficiency is achieved.	4
11	SYNTHESIS OF SENTENCES	Simple, Compound and Complex sentences.	Synthesizing and thereby enhancing the Skills of inserting many ideas to be conveyed into a single sentence – a major practice the students take up because Synthesis is the culmination of all grammar.	6
12	DIALOGUE WRITING	Exercises and Tasks – students are given classroom practice to come in pairs and perform	The Exercise ‘Completing the Dialogues’ makes the students answer in the Negative and in the Affirmative. The Yes/No Questions and the ‘WHY’ s and ‘HOW’ s make them interrogative in deliberations.	3
13	IDIOMS AND PHRASES	Collection of Idioms from the Oxford Dictionary and Phrases from Newspapers and Magazines and the Textbook.	The learning of speaking with Idioms and Phrases helps the students speak interestingly.	3
14	DIRECT IONAL INS TRUCTIONS	Drills and Exercises.	Communicative skills are strengthened.	3

15	COMPRE- HENSION	Reading, listening and understanding passages of various kinds. Making the students talk in pairs.	Basic skill of life – Reading - Understanding - Interpreting.	4
16	WRITING OFFICIAL / BUSINESS LETTERS	Students practice writing CVs, Complaints, Memorandums, Requests, Letters to the Editors of Newspapers, Journals and Magazines	Writing effectively is made possible - Motivating someone to do something for you.	5
17.	REPORTS	Reporting after attending industrial visits, meetings, seminars and discourses.	This form of communication makes the students communicate anything to anyone – Politics –Commerce - Industry - Sports - Science	4
18	VERBAL INTO VISUAL	Exercises - Reading and Making Graphics or Flow Chart.	A long text is read, understood and transformed into visual.	5
19	MINDMAP	Making the students write relevant points on a given topic.	Students practice this task and enhance their correlation of ideas.	3

Instruction Hours	66 Hrs
Continuous Assessment Tests I & II & Model Exam	07 Hrs
Revision	02 Hrs
Total	75 Hrs

Question Paper Pattern

Time: 3 Hours

Max: Marks: 75

Part- A (Grammar-30 Marks)

1. 10 Grammar questions will be given. All the 10 questions should be answered. Each question carries 3 Marks.

Part – B /section-I (Composition and Comprehension - 20 Marks)

2. 5 questions will be given. All the 5 questions should be answered .A ll the 5 question are “either - or-type”. Each question carries 4 Marks.

Part – B /section-II (Composition and Comprehension - 25 Marks)

3. 5 questions will be given .All the 5 questions should be answered. .All the 5 question are “either - or-type” of questions. Each question carries 5 Marks.

R5-202 ENGINEERING MATHEMATICS – III
(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours /Week	Hours /Semester	Marks			Duration
R5-202 ENGINEERING MATHEMATICS – III	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

OBJECTIVE: The Objective is to illustrate the concept and formulae to the diploma students. The Wide applications of Mathematics in the field of Engineering are also dealt with.

UNIT - I

12 Hours

ANALYTICAL GEOMETRY

Chapter - 1.1 EQUATION OF CIRCLE

Equation of circle – given centre and radius. General equation of circle – Finding centre and radius. Equation of circle on the line joining the points (x_1, y_1) and (x_2, y_2) as diameter. Simple Problems.

Chapter - 1.2 FAMILY OF CIRCLES

Concentric circles, Contact of two circles (Internal and External)-Simple problems. Orthogonal circles (results only). Simple Problems

Chapter - 1.3 INTRODUCTION TO CONIC SECTION

Definition of a Conic, Focus, Directrix and Eccentricity. General Equation of a conic $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ (statement only) Condition for conic

(i) for circle: $a = b$ and $h = 0$

(ii) for pair of Straight line:
$$\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$$

(iii) for parabola : $h^2 - ab = 0$

(iv) for ellipse : $h^2 - ab < 0$ and

(v) for hyperbola: $h^2 - ab > 0$ - simple problems.

UNIT - II

12 Hours

VECTOR ALGEBRA – I

Chapter - 2.1 VECTOR - INTRODUCTION

Definition of vector - types, addition, and subtraction of Vectors ,Properties of addition and subtraction - Position vector - Resolution of vector in two and three dimensions - Directions cosines, Direction ratios - simple problems.

Chapter - 2.2 SCALAR PRODUCT OF VECTORS

Definition of scalar product of two vectors – Properties – Angle between Two vectors. simple problems.

Chapter - 2.3 APPLICATION OF SCALAR PRODUCT

Geometrical meaning of scalar product - Work done by Force - simple problems.

UNIT - III**12 Hours****VECTOR ALGEBRA – II****Chapter - 3.1 VECTOR PRODUCT OF TWO VECTORS**

Definition of vector product of two vectors - Geometrical meaning - Properties – Angle between two vectors – unit vector perpendicular to two vectors - simple problems.

Chapter - 3.2 APPLICATION OF VECTOR PRODUCT OF TWO VECTORS & SCALAR TRIPLE PRODUCT

Definition of moment of a force. Definition of scalar product of three vectors – Geometrical meaning – Coplanar vectors . Simple Problems.

Chapter - 3.3 VECTOR TRIPLE PRODUCT & PRODUCT OF MORE VECTORS

Definition of Vector Triple product, Scalar and Vector product of four vectors Simple Problems.

UNIT - IV**12 Hours****INTEGRAL CALCULUS – I****Chapter - 4.1 INTEGRATION – DECOMPOSITION METHOD**

Introduction - Definition of integration– Integral values using reverse process of differentiation – Integration using decomposition method - simple problems.

Chapter - 4.2 INTEGRATION BY SUBSTITUTION

Integrals of the form $\int [f(x)]^n f'(x)dx, n \neq 1, \int \frac{f(x)}{f'(x)}dx$ and $\int F[f(x)]f'(x)dx$ - simple problems.

Chapter - 4.3 STANDARD INTEGRALS

Integrals of the form $\int \frac{dx}{a^2 - x^2}, \int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \sqrt{a^2 - x^2} dx, \int \sqrt{a^2 \pm x^2} dx.$

- simple problems.

UNIT - V**12 Hours****INTEGRAL CALCULUS–II****CHATER - 5.1 INTEGRATION BY PARTS**

Integrals of the form $\int x \sin x dx, \int x \cos x dx, \int x e^{mx} dx, \int x^n \log x dx, \text{ and } \int \log x dx.$

- simple problems

Chapter - 5.2 BERNOULLI'S FORMULA

Evaluation of the integrals $\int x^m \sin x dx, \int x^m \cos x dx, \text{ and } \int x^m e^{nx} dx$ where $m \leq 2$ using Bernoulli's formula - simple problems.

Chapter - 5.3 DEFINITE INTEGRALS

Definition of definite Integral. Properties of definite Integrals – simple problems.

Reference Books:

- Mathematics for Higher Secondary – I year and II year (TamilNadu Text Book Corporation)
- Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai
- Engineering Mathematics – Dr.P.Kandasamy & Others ,S.Chand & Co Ltd, New Delhi

Instruction Hours	60 Hours
Continuous Assessment Tests & Model Exam	07 Hours
Tutorials / Revision / Discussion	08 Hours
Total	75 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total		75 marks

R4-203 APPLIED MATHEMATICS

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours /Week	Hours /Semester	Marks			Duration
R4-203 APPLIED MATHEMATICS	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

OBJECTIVE: The objective is to illustrate the concept & formulae to the diploma students. The wide applications of Mathematics in the field of Engineering are also dealt with.

UNIT - I

12 Hours

PROBABILITY DISTRIBUTION – I

Chapter - 1.1

Definition of Random variable – Types – Probability mass function – Probability density function - simple problems.

Chapter - 1.2 MATHEMATICAL EXPECTATION

Mathematical Expectation of discrete random variable, mean and variance - simple problems.

Chapter - 1.3 BINOMIAL DISTRIBUTION

Definition of Binomial distribution $P(X = x) = nC_x p^x q^{n-x}$ where $x = 0, 1, 2, 3, \dots$ statement only. Expression for mean and variance - simple problems.

UNIT - II

12 Hours

PROBABILITY DISTRIBUTION – II

Chapter - 2.1 POISSON DISTRIBUTION

Definition of Poisson distribution $P(X = x) = \frac{e^{-\lambda} \lambda^x}{x!}$ where $x = 0, 1, 2, 3, \dots$ (statement only).

Expressions of mean and variance - simple problems.

Chapter - 2.2 NORMAL DISTRIBUTION

Definition of Normal distribution and standard normal distribution –(statement only). constants of Normal distribution(Results only) - properties of Normal distribution – simple problems using the table of standard normal distribution.

Chapter - 2.3 CURVE FITTING

Fitting of straight line using least square method (Results only) - simple problems.

UNIT - III

12 Hours

APPLICATION OF DIFFERENTIATION

Chapter - 3.1 VELOCITY AND ACCELERATION

Velocity and Acceleration – simple problems.

Chapter - 3.2 TANGENT AND NORMAL

Tangent and Normal – simple problems.

Chapter - 3.3 MAXIMA AND MINIMA

Definition of increasing and decreasing functions and turning points. Maxima and Minima of single variable only – simple problems.

UNIT - IV

12 Hours

APPLICATION OF INTEGRATION – I

Chapter - 4.1 AREA AND VOLUME

Area and Volume – Area of Circle. Volume of Sphere and Cone – simple problems.

Chapter - 4.2 FIRST ORDER DIFFERENTIAL EQUATION

Solution of first order variable separable type differential equation - simple problems.

Chapter - 4.3 LINEAR TYPE DIFFERENTIAL EQUATION

Solution of linear differential equation - simple problems.

UNIT - V

12 Hours

APPLICATION OF INTEGRATION – II

Chapter – 5.1 SECOND ORDER DIFFERENTIAL EQUATION – I

Solution of second order differential equation with constant co-efficients in the form

$$a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = 0 \quad \text{where } a, b \text{ and } c \text{ are constants - simple problems}$$

Chapter - 5.2 SECOND ORDER DIFFERENTIAL EQUATION – II

Solution of second order differential equations with constant co-efficients in the form

$$a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = f(x) \quad \text{where } a, b \text{ and } c \text{ are constants and } f(x) = e^{mx} \text{ - simple problems.}$$

Chapter - 5.3 SECOND ORDER DIFFERENTIAL EQUATION – III

Solution of second order differential equation with constant co-efficients in the form

$$a \frac{d^2 y}{dx^2} + b \frac{dy}{dx} + cy = f(x) \quad \text{where } a, b \text{ and } c \text{ are constants and } f(x) = \text{Sin } mx \text{ (or) } \text{Cos } mx \text{ - simple problems.}$$

Reference Books:

- Mathematics for Higher Secondary – I year and II year (TamilNaduText Book Corporation)
- Engineering Mathematics - Dr.M.K.Venkatraman, National Publishing Co, Chennai
- Engineering Mathematics – Dr.P.Kandasamy & Others ,S.Chand & Co Ltd, New Delhi

Instruction Hours	60 Hours
Continuous Assessment Tests & Model Exam	07 Hours
Tutorials / Revision / Discussion	08 Hours
Total	75 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total	75 marks	

R5-204 ENGINEERING PHYSICS – II

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-204 ENGINEERING PHYSICS – II	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	

OBJECTIVES:

At the end of the study of II Semester the student will be able to

- Identify good conductors and insulators of heat.
- Analyze the relation between pressure, volume and temperature of gas and to interpret the results.
- Understand the process of Isothermal and Adiabatic changes of gas and basic laws of thermodynamics.
- Acquire knowledge about liquefaction process of gases.
- Realize the inevitable need for tapping Alternate energy to address the looming energy crisis.
- Identify the characteristics and properties of LASER, Optical fiber.
- Acquire broader ideas about the process of remote sensing.
- Acquire knowledge about electrostatics and the principle of capacitors.
- Acquire knowledge about basic electrical circuits and heating effect of electric current.
- Acquire knowledge about electrical measuring instruments.
- Gain broader ideas of semiconductors, diodes, transistors, integrated circuits and logic gates.
- Identify, analyze and solve Engineering related problems involving expressions derived in all the above topics.

UNIT – I HEAT

1.1 TRANSFER OF HEAT

4 Hrs

Concept of Heat and Temperature – Centigrade, Fahrenheit and Kelvin scales of temperature measurement and conversion – Conduction – Coefficient of thermal conductivity and its SI unit – Good and poor conductors – Simple problems based on Coefficient of thermal conductivity – Convection – Definition – Radiation – Properties of thermal radiation – Newton's law of cooling – Simple problem based on Newton's law of cooling.

1.2 KINETIC THEORY OF GASES

3 Hrs

Postulates of kinetic theory of gases – Expression for the pressure of a gas on the basis of postulates of kinetic theory of gases – Relation between pressure, kinetic energy and absolute temperature of the gas – Simple problems based on the expression for the pressure of a gas.

1.3 SPECIFIC HEAT CAPACITY

3 Hrs

Specific heat capacity of a substance (solids and liquids) – Definition – Thermal capacity – Heat gained by a body – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant pressure – Ratio of specific heat capacities – Explanation for C_p is greater than C_v – Derivation of Mayer's relation – Calculation of Universal gas constant R from the gas equation $PV = RT$. Simple problems based on Mayer's relation.

UNIT – II THERMODYNAMICS, LIQUEFACTION OF GASES AND NON – CONVENTIONAL ENERGY

2.1 THERMODYNAMICS

4 Hrs

Concept of Internal Energy – First Law of Thermodynamics– Statement - Concept of Indicator Diagram (P-V Diagram) -Isothermal and Adiabatic changes – Explanation – Equations for isothermal and adiabatic changes (No derivation) Simple problems based on equations $P_1V_1 = P_2V_2$ and $P_1V_1^\gamma = P_2V_2^\gamma$ –Second law of thermodynamics – Clausius statement and Kelvin’s statement –Heat engine- Working of Carnot’s reversible engine with indicator diagram and its efficiency.

2.2 LIQUEFACTION OF GASES

3 Hrs

Difference between gas and vapour – Critical temperature, critical pressure and critical volume – Definitions – Principle used in cascade process – Cascade process of liquefaction of oxygen – Disadvantages of cascade process – Temperature of inversion – Joule Thomson effect – Liquefaction of air by Linde’s process.

2.3 NON – CONVENTIONAL ENERGY

3 Hrs

Introduction – Non – renewable and Renewable (Alternate) energy sources – Examples – Solar energy, wind energy – Advantages and disadvantages of renewable energy.

UNIT – III LIGHT

3.1 OPTICS

4 Hrs

Reflection – Laws of reflection – Refraction – Laws of refraction – Refractive index of a medium – Definition – Prism – Angle of the prism – Angle of deviation – Angle of minimum deviation – i-d curve – Derivation of refractive index of glass prism using minimum deviation – Total internal reflection – Condition for the total internal reflection - Fiber optics – Introduction – problems using the refractive index.

3.3 LASER

3 Hrs

LASER – Characteristics of LASER – principle of LASER – Spontaneous emission – Stimulated emission – population inversion – Ruby laser – Construction and working – Uses of LASER.

3.4 REMOTE SENSING

3 Hrs

Introduction – Active and passive remote sensing – Explanation and examples – Components of remote sensing – Data acquisition, data analysis and reference data – RADAR – principle and working with block diagram.

UNIT – IV ELECTRICITY

4.1 Electrostatics:

3 Hrs

Electric Charge – Coulomb’s Inverse Square Law – Electric Field – Electric field due to Point Charge— Electric Potential -Electric Potential Difference. Electric Dipole –Parallel plate capacitor— Capacitance of a capacitor – Definition – ‘ farad ’– Definition – expressions for effective capacitance when capacitors are connected in series and in parallel – Simple problems based on effective capacitance for series and parallel connection of capacitors.

4.2 ELECTRICAL CIRCUITS

3 Hrs

Ohm’s law – Laws of resistances – Resistivity, Conductivity, Superconductivity and Meissner effect – Definitions – Kirchhoff’s current and voltage laws – Condition for balancing the Wheatstone’s bridge. Simple problems based on Laws of resistance and on expression for resistivity.

4.3 EFFECTS OF CURRENT

1 Hr

Heating effect of electric current-Joule’s Law of Heating– Electric Power – Electric Fuse – Electric heater.

4.3 MEASURING INSTRUMENTS**3 Hrs**

Expression for the force acting on a current carrying straight conductor placed in a uniform magnetic field (No derivation) – Fleming's Left Hand rule – Expression for the torque experienced by a rectangular current carrying coil placed inside a uniform magnetic field – Working of a moving coil galvanometer and its merits – Conversion of galvanometer into an Ammeter and Voltmeter. Simple problems based on conversion of galvanometer into ammeter and voltmeter.

UNIT – V ELECTRONICS**5.1 SEMI CONDUCTORS****3 Hrs**

Semi conductors – Energy bands in solids – Energy band diagram of good conductors, insulators and semi conductors – Concept of Fermi level – Intrinsic semiconductors – Concept of holes – Doping – Extrinsic semiconductors – P type and N type semiconductors.

5.2 DIODES AND TRANSISTORS**4 Hrs**

P-N junction diode – Forward bias and reverse bias – Rectification action of diode – Working of full wave rectifier using P N junction diodes – PNP and NPN transistors – Three different configurations – Advantages of common emitter configuration – Working of NPN transistor as an amplifier in common emitter configuration.

5.3 DIGITAL ELECTRONICS**3 Hrs**

Digital electronics – Introduction – Logic levels – Basic logic gates: OR, AND and NOT gates – Universal logic gates: NAND and NOR gates – Symbolic representation, Boolean expression and Truth table for all above logic gates – Integrated circuits – Levels of integration – SSI, MSI, LSI and VLSI – Advantages of ICs.

Reference Books:

- Fundamentals of physics by Brijlal and Subramaniam
- Physics for Higher secondary – First & Second year – Volume I & II – Tamilnadu text book corporation 2004 & 2005
- Engineering Physics – R. K. Gaur and S. L. Gupta
- Non- Conventional energy sources – G.D. Rai.- Khanna publishers
- Text book of Remote sensing and Geographical information systems - M. Anji Reddy BS publications.
- Fundamentals of Electricity – D.N. Vasudeva – S. Chand & co

Instruction Hours	50 Hours
Continuous Assessment Test I, II & Model exam	07 Hours
Revision / Assignment / Discussion	03 Hours
Total	60 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total		75 marks

R5-205 ENGINEERING CHEMISTRY – II

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hours / Week	Hours / Semester	Marks			
R4-205 ENGINEERING CHEMISTRY – II	4 Hrs	60 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

RATIONALE:

Modern development of industries require more understanding of materials required for Engineering and industrial purposes. This part of chemistry explains various aspects with regard to environment, fuels, metals and alloys and polymers. This subject will develop basic understanding and skill of Engineering Students.

OBJECTIVES:

The objective of this Course is to make the student:

- To acquire knowledge about Environmental Chemistry.
- To acquire knowledge about fuels, Rocket fuels and analysis and refractories.
- To know about extraction of metals, alloys, and abrasives.
- To acquire knowledge about cement, ceramics, lubricants and adhesives.
- To know about polymer materials.

UNIT - I ENVIRONMENTAL CHEMISTRY

1.1 Air Pollution

5 Hrs

Definition Pollution and Air pollution – Definition – Air pollutants (SO₂, H₂S, HF, CO and Dust) – Harmful effects – Formation of Acid Rain – Harmful effects – Green House Effect – Causes – Global warming – Harmful effects – Ozone Layer – Importance – Causes for Depletion of Ozone Layer (No equations) – Effects of Ozone Layer Depletion – Control of Air Pollution.

1.2 Water Pollution

4 Hrs

Causes of Water Pollution – Sewage, Effluents, Algae and Micro organisms – Harmful effects – Sewerage – Definition – Sewage Disposal – Industrial Effluents – Harmful effects of Effluents – Harmful effects of Heavy Metal Ions – Lead, Cadmium, Zinc and Copper – Treatment of Effluents – Eutrophication – Definition and harmful effects.

1.3 Solid Waste Management

1 Hr

Solid Waste – Definition – Problems – Types of Solid Waste – Methods of disposal – Landfill and Incineration. Recycling – Definition – Examples – Advantages of Recycling (Basic ideas)

1.4 Green Chemistry

2 Hrs

Definition – Goals of Green Chemistry (Basic ideas)

UNIT – II FUELS, ROCKET PROPELLANTS AND REFRACTORIES

2.1 Fuels

6 Hrs

Fuels – Wood – Coal – Varieties of Coal – Composition – Specific uses – Liquid fuels – Petroleum – Fractional distillation – Fractions and uses – Cracking (Concept only) – Liquid Hydrogen as fuel – Gaseous fuels – Preparation, composition and specific uses of Producer gas and Water gas – Composition and uses of LPG – Relative advantages comparison of solid, liquid and gaseous fuels.

2.2 Rocket Propellants

2 Hrs

Definition – essential characteristics – classification of propellants – brief account of solid and liquid propellants with example.

2.3 Refractory

2 Hrs

Definition – Requirements of a good Refractory – Classification – Acidic, Basic and Neutral Refractory – Examples and uses – Uses of Fireclay bricks, Alumina bricks and Silica bricks.

UNIT- III METALLURGY, EXTRACTION OF METALS, ALLOYS AND ABRASIVES

3.1 Metallurgy

2 Hrs

General principles – Ores – Minerals, gangue, flux, Slag – crushing and grinding of ore – dressing of ore – gravity separation – froath floatation process and magnetic separation – Chemical methods of purifying ore – roasting – calcination, smelting – refining – electrolytic refining – copper and aluminum.

3.2 Extraction of metals

2 Hrs

Extraction of Tungsten and Titanium – Uses of Tungsten and Titanium.

3.3 Alloys

3 Hrs

Definition – Purpose of alloying – Types – Ferrous Alloys – Composition and Uses of Stain less Steel, Chromium Steel and Vanadium Steel – Non-ferrous alloys – Composition and uses of Nichrome, Dutch metal, German silver, Gunmetal and Duralumin.

3.4 Abrasives

3 Hrs

Definition – Classification – Hardness in Moh's scale – Natural abrasives – Diamond, Corundum, Emery and Garnet – Synthetic abrasives – Carborundum – Boron carbide – Manufacture – Properties and uses.

UNIT - IV CEMENT, CERAMICS, LUBRICANTS AND ADHESIVES

4.1 Cement

3 Hrs

Definition – Manufacture of Portland Cement – Wet Process – Setting of Cement (No equation).

4.2 Ceramics

3 Hrs

White pottery – Definition – Manufacture of White pottery – Uses – Definition of Glazing – Purpose – Method – Salt glazing.

4.3 Lubricants

2 Hrs

Lubricants. Definition – Characteristics of Lubricant – Types of Lubricants – Solid, Semi-Solid and Liquid

4.4 Adhesives

2 Hrs

Definition – Requirements of good adhesives – Natural adhesive – uses of Shellac, Starch, Asphalt – Synthetic adhesive – uses of Cellulose Nitrate, PVC, Phenol-formaldehyde and Urea -formaldehyde.

UNIT - V POLYMER CHEMISTRY

5.1 Plastics

5 Hrs

Polymerization – Definition – Types of polymerization – Addition polymerization – Formation of Polythene – Condensation polymerization – Formation of Bakelite – Types of plastics – Thermoplastics and Thermo set plastics – Differences – Mechanical properties of plastics – Advantages of plastics over traditional materials (Wood and Metal) – Definition of Reinforced or filled plastics – Advantages – Applications – Polymers in Surgery – Biomaterials – Definition – Biomedical uses of Polyurethane, PVC, Polypropylene and Polyethylene.

5.2 Rubber

5 Hrs

Definition – Preparation from Latex – Defects of natural rubber – Compounding of rubber – Ingredients and their functions – Vulcanization – Definition and Purpose – Reclaimed rubber – Definition – Process – Properties and uses.

Reference Books:

- Chemistry of Engineering Material - C. V. Agarwal, Andranaidu C. Parameswara Moorthy – B.S. Publications.
- Engineering Chemistry – Uppal – Khanna Publishers
- A Text Book of Inorganic Chemistry – P L Sony – S. Chand Publication
- Environmental Chemistry–V P Kudesia – Pragati Publishers.
- Rain Water Harvesting– Hand Book – Chennai Metro Water

Instruction Hours	50 Hours
Continuous Assessment Test I, II & Model exam	07 Hours
Revision / Assignment / Discussion	03 Hours
Total	60 Hours

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

Answer all 5 questions, choosing any two sub-divisions out of three from each question. All questions carry 5 marks.

Part A	5 x 2 marks	10 marks
Part B	5 x 3 marks	15 marks
Part C	5 x (2 x 5) marks	50 marks
Total		75 marks

R5-206CM ENGINEERING GRAPHICS – II (For DCE & DME)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours/ Week	Hours/ Semester	Marks			Duration
	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	
R5-206CM ENGINEERING GRAPHICS - II					25	75

MANUAL DRAWING

Objectives

- Manual drawing
- In V unit, Theoretical approach in Computer Aided Design commands is given.

MAJOR DIVISIONS:

- Development of surfaces
- Constructions of special curves, Construction of polygon, Projection of solids
- Section of Solids, Isometric projections
- Orthographic projection
- CAD COMMANDS (Theoretical approach only)

Unit	R5 – Engineering Graphics-II	Hours
I	<p>1.1 Constructions of special curves Geometric curves: Definition - construction of cycloid - epicycloids – hypocycloid – exercises. Involutés of a circle - Archimedean spiral – helix – exercises.</p> <p>1.2 Construction of Polygon: Construct triangle, square, pentagon, hexagon by side distance in various positions – construction by inscribe & circumscribe a circle and by angle.</p> <p>1.3 Projection of solids Introduction - important terms - classification of solids – triangular, cube, pentagonal and hexagonal prisms and pyramids - solids of revolution – cylinder and cone. Projections of solids in simple positions – parallel to one plane and perpendicular to other plane -projections of solids with axis inclined to HP and parallel to VP - projections of solids with axis inclined to VP and parallel to HP - Projections of solids with axis parallel to both planes - exercises.</p>	18
II	<p>2.1 Development of surfaces Methods of development - Need for development - Development of prism, cylinder, cone and pyramids, truncated prisms and cylinder, frustum of pyramids and cone – Exercises in triangular, square, pentagon and hexagon prisms and pyramids - Cylinder and cone. Development of miscellaneous objects - T-pipe, elbow and funnel</p>	14

III	<p>3.1 Section of Solids Introduction – terminology - true shape - sectional view - need for sectional view - cutting plane – section lines - triangular and hexagonal prisms and pyramids - cylinder and cone. Position of solids – Axis parallel to one plane and perpendicular to other plane - axis parallel to both planes - exercises. Position of cutting planes – cutting plane perpendicular to one plane and parallel to another plane - section plane perpendicular to one plane and inclined to another plane.</p> <p>3.2 Isometric projections I introduction – isometric view - isometric projection – methods of drawing an isometric view - box method - isometric view of solids – isometric view of truncated solids - Isometric view irregular curves - circles in isometric method – four centre method for drawing an ellipse - arcs of circles in isometric view. Isometric view of the object from the given orthographic view - exercises.</p>	18
IV	<p>4.1 Orthographic projection Introduction – projection terms - Orthographic projection - Co-ordinate planes of projection -Systems of orthographic projection - First angle orthographic projection- Third angle Orthographic projection - Comparison of first and third angle projections. Projection of Machine components / parts / objects in three views using first angle projection only – exercise</p>	11
V	<p>5.1 CAD COMMANDS (Theoretical approach only) Draw and modify commands- Arrays- Rectangular & Polar Array- Properties-stretch - text- dimension</p>	4

Instruction Hours	65 Hours
Continuous Assessment Test I, II & Model Exam	07 Hours
Revision / Assignment / Discussion	03 Hours
Total	75 Hours

QUESTION PAPER PATTERN

Answer all the questions in the drawing sheet only.

1. One question from development of surfaces- 10 marks
2. One question from geometrical curves or polygon -10 Marks
3. Projection of solids -10 Marks
4. One question from section of solids or isometric projection - 15 Mark
5. Orthographic projection - 30 marks

R5-206EI ENGINEERING GRAPHICS - II
(For DEEE & DIT)
COMPUTER AIDED DRAWING PRACTICAL

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hours / Week	Hours / Semester	Marks			
R5-206EI ENGINEERING GRAPHICS - II	5 Hrs	75 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

STUDY EXPERIMENTS:**7 Hours****Introduction to AutoCAD**

History of AutoCAD-Applications- Advantages over manual drafting - hardware requirements – software requirements – window desktop – AutoCAD screen interface – menus – toolbars - How to start AutoCAD – command groups – How to execute command – types of coordinate systems – absolute-relative-polar.

EXERCISE:**I. Electrical Symbols:****15 hours**

Draw symbols of – DC armatures – alternators – squirrel and slip ring induction motors – field winding - shunt, series and compound DC motors – relays – contactors – fuses – main switch – electric bell – earth – aerial – DPST – DPDT – TPST – Network link – ammeters – voltmeters – wattmeter – energy meters – frequency meters – power factor meters – timers – buzzers – transformers – auto transformers – IGBT - Incandescent lamp, Fluorescent Lamp, Signal lamp, Push button, Fire alarm, Siren, Water Heater, Ceiling Fan, Exhaust Fan

II. Electronics Symbols:**15 Hours**

Draw symbols of Resistors – inductors – capacitors - diodes – transistors – FET – SCR – UJT – DIAC – TRIAC – MOSFET'S - LOGIC GATES – AND – OR – NOT – NAND – NOR – EXOR

III. Drawing – Electrical Connection Diagrams:**30 Hours**

1. Draw the panel wiring diagram of two shunt generators in parallel.
2. Draw the mush winding diagram of a three phase induction motor.
3. Draw the control circuit of automatic rotor starters.
4. Draw the connection diagram of on load tap changer.
5. Draw the circuit of three phase transformers in parallel.
6. Draw the connections of three point starter.
7. Draw the connections of direct on line starter.
8. Draw the line diagram of wiring of a drawing hall.
9. Draw the single line diagram of residential wiring
10. Draw the single line diagram of indoor substation

Theory & Practice Classes	67 Hours
Revision / Repetition	08 Hours
Total	75 Hours

QUESTION PAPER PATTERN

Drawing the symbols in Electrical and Electronics	
Any 10 Symbols (10 questions x 2marks)	- 20 marks
Electrical Connection Diagram (Any one)	- 50 marks
Viva-voce	- 05 marks
TOTAL	- 75 marks

R5-207 ENGINEERING PHYSICS PRACTICAL – II

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	External Exam	Total	
R5-207 ENGINEERING PHYSICS PRACTICAL – II	2 Hrs	30 Hrs	25	75	100	3 Hrs

LIST OF EXPERIMENTS WITH OBJECTIVES:

- Torsion pendulum:** Determine the moment of inertia of the disc and rigidity modulus of the material of the thin wire by torsion pendulum.
- Young's modulus:** Determine the Young's modulus of the material of the beam by uniform bending method.
- Joule's calorimeter:** Determine the specific heat capacity of water.
- Refractive index of prism** - using glass prism and drawing board and drawing i-d curve, from the i-d curve the angle of minimum deviation is to be determined.
- Laws of resistances:** Resistance in series and in parallel using Ohm's law.
- Metre Bridge:** To determine the unknown resistance of the given wire.
- PN junction diode:** To draw the voltage – current characteristics in forward and to find the dynamic forward resistance and knee voltage from the graph.
- Transistor characteristics:** Input, Output and transfer characteristics of the transistor and to find out input impedance, current gain and output admittance of the transistor.
- Demonstration experiment:** Newton's law of cooling

Theory & Instruction classes	08 Hours
Experiments 8 x 2	16 Hours
Revision / Repetition	04 Hours
Internal Practical Examination	02 Hours
Total	30 Hours

QUESTION PAPER PATTERN

Answer any one of the above experiment chosen by random method. The marks will be awarded as per the scheme of valuation.

SCHEME OF VALUATION

S. NO	CATEGORY	MARKS
1	Formula with explanation	10
2	Figure / Circuit	05
3	Tabulation	10
4	Observation	35
5	Calculation	10
6	Result	05
Total		75

R5-208 ENGINEERING CHEMISTRY PRACTICAL – II

(Common for All Branches)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	External Exam	Total	
R5-208 ENGINEERING CHEMISTRY PRACTICAL – II	2 Hrs	30 Hrs	25	75	100	3 Hrs

OBJECTIVES:

At the end of the program the student will be able to identify the acid and basic radicals present in the given engineering materials like Pollutant, Fertilizer, Fungicide, Mordant, Lime stone, Electrolyte, Gypsum

Qualitative Analysis

ANALYSIS OF ENGINEERING MATERIALS:

Identification of acid and basic radicals in:

Acid Radicals;

1. Carbonate
2. Chloride
3. Nitrate
4. Sulphate

Basic Radicals;

Radicals	Group
1. Lead	I
2. Copper	II
3. Aluminium	III
4. Zinc	IV
5. Barium	V
6. Calcium	VI
7. Magnesium	VI
8. Ammonium	

Analysis the given inorganic simple salt and the report the acid radical and basic radical present in record book it.

Instruction Hours	06 Hours
Experiments 10 x 2	20 Hours
Revision / Repetition	04 Hours
Total	30 Hours

SCHEME OF VALUATION

Identification of Acid radical with systematic procedure	35 Marks
Identification of Basic radical with systematic procedure	35 Marks
Viva voce	05 Marks
TOTAL	75 marks

Time: 3 Hrs

MODEL QUESTION PAPER

Max. Marks: 75

1. Analyse the given Inorganic simple salt and report the acid radical and basic radical present in it.

R5-209C WORKSHOP PRACTICE – II (For DCE)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-209C WORKSHOP PRACTICE – II	Hours / Week	Hours / Semester	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

I. PLUMBING

1. Plumbing is the skilled trade of working with pipes, tubing and plumbing fixtures for drinking water systems and the drainage of waste.
2. The plumbing industry is a basic and substantial part of every developed economy due to the need for clean water, and proper collection and transport of wastes.
3. Plumbing also refers to a system of pipes and fixtures installed in a building for the distribution of potable water and the removal of waterborne wastes.
4. Plumbing is usually distinguished from water and sewage systems, in that a plumbing system serves one building, while water and sewage systems serve a group of buildings or a city.
5. To install pipes and fixtures.
6. To repair or replace all kinds of leaks.

Exercises (Batch wise)

15 Hrs

1. Install a sink/washbasin and tap using different PVC pipe accessories such as bend, tee, socket and valve.
2. Cutting, bending and external threading of GI pipes using Die.
3. Repair a leaking water tap and fix water meter.
4. Lay PVC pipes to install rain water harvesting.

II. INTRODUCTION TO CARPENTRY

1. Introduction of carpentry hand tools and wood working Jack plane m/c - Planning and checkup.

Exercises (Batch wise)

12 Hrs

1. Half lap joint
2. Lap dove tail joint
3. Making formwork for lintel cum sunshade and deshuttering.

III. WIRING

1. Study about the safety in wiring.
2. Study of tools.
3. Study about the earthing.
4. Identify different electrical fitting and accessories.
5. Identify the types of wires with colour code.
6. Identify the symbols in circuit diagram.
7. Practice simple wiring.
8. Uses of multimeter.

Exercises

15 Hrs

1. One lamp controlled by one-way switch – measure and check the voltage and current using multimeter.
2. Two lamps connected in series - measure and check the voltage and current using multimeter.
3. Two lamps connected in parallel - measure and check the voltage and current using multimeter.
4. Staircase wiring.

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Plumbing Exercise	-	35 marks
Carpentry or Wiring (Any one) Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

R5-209M WORKSHOP PRACTICE – II (For DME)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
	Hours / Week	Hours / Semester	Marks			Duration
R5-209M WORKSHOP PRACTICE – II	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

RATIONALE:

This subject Workshop practice is aimed at providing basic understanding of the fundamentals of practical sections; mainly planning, marking, cutting and development of sheet metal, forging and its processes, the tools, the use of measuring instruments in engineering applications and practices. Also the basics of working with pipes, tubing and plumbing fixtures for drinking water systems and the drainage of waste called Plumbing is included. This subject is planned to include sufficient practices which would help the student to understand the principles of different trades .

OBJECTIVES:

At the end of the practice, the students will be able to,

- Acquire skills in basic engineering practice.
- Identify the hand tools and instruments.
- Study and use measuring instruments.
- Practical skills in the plumbing, smithy and sheet metal trades.

I. PLUMBING

18 Hours

Introduction :

- Study of different pipe materials and pipe fittings like pipe, bend, elbow, nipple, socket, tee, cross, union, plug, flange etc.,
- Study of Valves like Gate valve, Ball valve, Angle valve, Check valve, Float valve etc., and meters
- Methods of pipe joints and plumbing techniques

Exercises:

- Install a sink / wash basin and tap using different PVC pipe accessories such as bend, tee, socket and valve.
- Cutting, bending and external threading of GI pipes using Die.
- Repair a leaking water tap and fix water meter.
- Lay PVC pipes to install rain water harvesting.
- To repair or replace all kinds of leaks.
- House plumbing including fixing a motor with pipe connections

II. SMITHY**12 Hours****Introduction :**

- Introduction to tools and equipments
- Study about the types of tongs
- Study about the types of blowers

Exercises:

1. Round to square
2. Round to hexagon
3. Round to flat
4. Square to 'S' bend making

III. SHEET METAL**12 Hours****Introduction :**

- Introduction to tools and equipments
- Study about the types of joints

Exercises:

- Square tray
- Cylinder
- Hopper
- Dust bin

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Plumbing Exercise	-	35 marks
Smithy or Sheet metal (Any one) Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

R5-209E WORKSHOP PRACTICE – II (For DEEE)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			
R5-209E WORKSHOP PRACTICE – II	Hours / Week	Hours / Semester	Marks			Duration
	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	
			25	75	100	3 Hrs

RATIONALE:

Workshop practice II is aimed at providing basic understanding of the fundamentals of practical sections; mainly wiring connections, standards & conventions of wiring, the tools, the use of measuring instruments in engineering applications and Computer hardware servicing. The subject is planned to include sufficient practices which would help the student to understand the principles of wiring and computer servicing.

ELECTRICAL EXERCISES: (21 hours)

1. Safety precautions, electric shock treatment, need of earthing and its types
2. Control of one lamp by one switch
3. Two lamps controlled by one-way switch in series and measure the current and voltage using multimeter.
4. Two lamps controlled by one-way switch in parallel and measure the current and voltage using multimeter.
5. Two lamps controlled by two switches in Plug point.
6. Dim and Bright wiring practice.
7. Stair case wiring.

BASICS OF COMPUTER HARDWARE: (21 hours)

1. Identification of front panel indicators, switches in a computer system and Identification of the rear side connectors available in a Computer system.
2. Familiarizing the computer system layout: Making the positions of SMPS, Motherboard, HDD/CD and add-on cards.
3. To draw the layout of a Pentium Motherboards and marking the following items in it. CPU used, RAM, Cache, Cooling fan, I/O slots and O/P parts available.
4. Install internal drives with respective cables.
5. Configuring CMOS – setup program.
6. Operating system installation using windows and a. HDD partition b. HDD formatting, connecting external devices.

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Electrical Exercise	-	35 marks
Computer Hardware Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks

R5-209i WORKSHOP PRACTICE – II

(For DIT)

Teaching and Scheme of Examination:

No. of weeks per semester: 15

SUBJECT	INSTRUCTION		EXAMINATION			Duration
	Hours / Week	Hours / Semester	Marks			
R5-209i WORKSHOP PRACTICE – II	3 Hrs	45 Hrs	Internal Assessment	External Exam	Total	3 Hrs
			25	75	100	

RATIONALE:

Workshop practice II is aimed at providing basic understanding of the fundamentals of practical sections; mainly wiring connections, standards & conventions of wiring, the tools, the use of measuring instruments in engineering applications and Computer hardware servicing. The subject is planned to include sufficient practices which would help the student to understand the principles of wiring and Electronic concepts.

ELECTRICAL EXERCISES:

(21 hours)

1. Safety precautions, electric shock treatment, need of earthing and its types
2. Control of one lamp by one switch
3. Two lamps controlled by one-way switch in series and measure the current and voltage using multimeter.
4. Two lamps controlled by one-way switch in parallel and measure the current and voltage using multimeter.
5. Two lamps controlled by two switches in Plug point.
6. Dim and Bright wiring practice.
7. Stair case wiring.

ELECTRONICS EXERCISES:

(21 hours)

1. Study of following Electronic instruments
a) Digital meter b) Cathode Ray Oscilloscope (CRO) c) Signal generator.
2. Checking and analysis of active and passive components.
3. Practicing bread board connection for basic electronic circuits.
4. Preparation of simple switching circuit using transistor.
5. Preparation of half wave rectifier circuit using Diode and observe the waveforms using CRO.
6. Practicing soldering and de-soldering of electronic components.

Theory & Practice Classes	42 Hours
Revision / Repetition	03 Hours
Total	45 Hours

QUESTION PAPER PATTERN

Electrical Exercise	-	35 marks
Electronics Exercise	-	35 marks
Viva-voce	-	05 marks
TOTAL	-	75 marks