PONDICHERRY UNIVERSITY PUDUCHERRY



SYLLABUS AND REGULATIONS IN

3- YEAR DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER PATTERN

FROM THE ACADEMIC YEAR 2024 – 2025

<u>REGULATIONS</u>

1. Description of the Course:

a. Full Time (3 years)

The Course for the Full Time Diploma in Engineering shall extend over a period of Three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

2. Condition for Admission:

Condition for admission to the Diploma courses shall be required to have passed in The S.S.L.C Examination of the Board of Secondary Education of Concern State. (Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course of Concern State (Or)

The Matriculation Examination of Concern State. (Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education of Concern State.

Note: In addition, at the time of admission the candidate will have to satisfy certain Minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in concern state affiliated to the Higher Secondary Board with Eligibility for university Courses of study or equivalent examination & should have Studied the following subjects. The candidates pass in 2 Years ITI with appropriate Trade or Equivalent examination.

SI. No	Courses	H.Sc Academic Subjects Studied	H.Sc V Subjec	H.Sc Vocational Subjects Studied		
			Related subjects	Vocational subjects		
1	All the Regular and Sandwich Diploma Courses	Physics and Chemistry as compulsory along with Mathematics / Biology	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical	2 years course to be passed with appropriate Trade	

• For the Diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical's may also be taken for arriving the eligibility.

• Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.

• For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Commercial Practice Diploma courses the candidates Studied the related subjects will be given first preference.

- Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses •
- 4. Age Limit

: No Age limit.

5. Medium of Instruction : English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the Prescribed course of study for a period of not less than 3 academic years in any Institution affiliated to Pondicherry University, 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 Courses are as given below

Diploma Course	Minimum Period	Maximum period
Full time	3 years	6 years
Full time Lateral entry	2 years	5 years

This will come into effect from New Scheme onwards i.e. from the academic year 2024-2025.

7. 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. The curriculum outline is given in Annexure – I.

8. Examinations:

Board 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 40 marks are allotted for internal assessment. Board Examinations are conducted for 100 marks and reduced to 60. The total marks for result are 60 + 40 = 100 Marks.

9. Continuous Internal Assessment:

A. For Theory Subjects:

The Internal Assessment marks for a total of 40 marks, which are to be distributed as follows:

i) Subject Attendance

10 Marks

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

80% - 83%	2 Mark	
84% - 87%	4 Marks	
88% - 91%	6 Marks	
92% - 95%	8 Marks	
96% - 100%	10 Marks	
ii) Test		10 Marks
2 Tests each of	f 2 hours duration for a total of 50	
Marks are to b	e conducted. Average of these	
Two test marks	s will be taken and the marks to be reduced to:	05 Marks
The Test – III	is to be the Model Examination	
Covering all th	e five units and the marks obtained	
Will be reduce	d to:	05 Marks

TEST	UNIT	WHEN TO CONDUCT	MARKS	DURATION
TEST I	Unit – I & II	End of 6th week	50	2 HRS
TEST II	Unit – III & IV	End of 12th week	50	2 HRS
TEST III	Model Examination: Covering all the 5 Units. (Board Examinations-question paper-pattern).	End of 16th week	100	3 HRS

From the Academic Year 2024 – 2025 onwards.

- Question Paper Pattern for the Test I and Test II is as follows.
- The tests should be conducted by proper schedule.
- Retest marks should not be considered for internal assessment.

Without Choice:

Part A Type questions:	6 Questions \times 1 mark	06 marks
Part B Type questions:	7 Questions \times 2 marks	14 marks
Part C Type questions:	2 Questions \times 15 marks	30 marks
	Total	50 marks

iii) Assignment:

For each subject Three Assignments are to be given each for 20 marks and the Average marks scored should be reduced for **5 marks**

iv) Seminar Presentation

The students have to select the topics either from their subjects or general subjects which will help to improve their grasping capacity as well as their capacity to express the subject in hand. The students will be allowed to prepare the material for the given topic using the library hour and they will be permitted to present seminar (For First and Second year, the students will be permitted to present the seminar as a group not exceeding six members and each member of the group should participate in the presentation. For the Third Year, the students should present the seminar viii individually.) The seminar presentation is mandatory for all theory subjects and carries 5 marks for each theory subject. The respective subject faculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (2 ½ marks for the material submitted in writing and 2 ½ marks for the seminar presentation). For each subject minimum of two seminars are to be given and the average marks scored should be reduced to 5 marks. All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be kept in safe custody in the department for verification and audit. It should be preserved for one semester after publication of Board Exam results and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:

The Internal Assessment mark for a total of 60 marks which are to be distributed as Follows:-

a) Attendance	: 20 Marks
	(Award of marks same as theory subjects)
b) Procedure/ observation and ta	abulation/
Other Practical related Work	: 20 Marks
c) Record writing	: 20 Marks
TOTAL	: 60 Marks

5 Marks

5 Marks

• All the Experiments/Exercises indicated in the syllabus should be completed and the same to be given for final Board examinations.

• The observation note book / manual should be maintained for 20 marks. The observation note book / manual with sketches, circuits, programme, reading and Calculation written by the students manually depends upon the practical subject during Practical classes should be evaluated properly during the practical class hours with date.

• The Record work for every completed exercise should be submitted in the subsequent practical classes and marks should be awarded for 20 marks 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 (including Observation and Record writing) and the marks Awarded for attendance is to be added to arrive at the internal assessment mark for the Practical. (60 marks)

• Only regular students, appearing first time have to submit the duly signed bonafide record note book / file during the Practical Board Examinations.

All the marks awarded for Assignments, Tests, Seminar presentation and Attendance should be entered periodically in the Personal Theory Log Book of the staff, who is handling the theory subject. The marks awarded for Observation, Record work and Attendance should be entered periodically in the Personal Practical Log Book of the staff, who is handling the practical Subject.

10. Communication Skill Practical, Computer Application Practical and Physical Education:

The Communication Skill Practical and Computer Application Practical with more emphasis are being introduced in First Year. Much Stress is given to increase the communication skill and ICT skill of students. As per the recommendation of MHRD and under Fit India scheme, the Physical education is introduced to encourage students to remain healthy and fit by including physical activities and sports

11. Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part of the curriculum and in partial fulfillment for the award of Diploma by the Pondicherry University. In order to encourage students to do Worthwhile and innovative projects, every year prizes are awarded for the best three reviewed twice in the same semester. The project work is approved during the V Semester by the properly constituted committee with guidelines.

a) Internal assessment mark for Project Work & Internship:

	Total	60 marks
	(Award of marks s	ame as theory subjects)
Attendance		20 marks
Project Review II		20 marks
Project Review I		20 marks

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work & Internship in Board Examinations:

Demonstration/Presentation	25 marks
Report	25 marks
Viva Voce	30 marks
Internship Report	20 marks
Total	100* marks

*Examination will be conducted for 100 marks and will be converted to 40 marks

c) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks.

The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centers / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.

12. Scheme of Examinations:

The Scheme of examinations for subjects is given in Annexure - II.

13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the Pondicherry University 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/she 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 University Examinations marks put together, subject to the condition that he/she secures at least a minimum of 40 marks out of 100 marks in the University Theory Examinations and a minimum of 50 marks out of 100 marks in the University Practical Examinations and also earned 122 credits within the maximum duration of course.

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2027 onwards (Joined first year in 2024 -2025) will be 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/she 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 $2/3/3\frac{1}{2}/4$ years [Full Time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class with Distinction:

A candidate will be declared to have passed in **First Class with Distinction** if he/she 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 $2/3/3^{1/2}/4$ years [Full time (lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she 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 $2 / 3 / 3\frac{1}{2} / 4$ years [Full time(lateral entry)/Full Time/Sandwich/Part Time] without any break in study.

Second Class:

All other successful candidates will be declared to have passed in Second Class. The above classifications are also applicable for the Part-Time students who pass out Final Examination from October 2024 /April 2025 onwards (both joined First Year in 2020 -2021)

15. 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 uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

Range of Marks	Grade	Grade Points
91-100	A+	10
81-90	А	9
71-80	B+	8
61-70	В	7
51-60	C+	6
46-50	С	5
40-45	D	4
<40	F	0
Failed due to shortage of Attendance	FR	0

Award of Class based on CGPA

THEORY	MAX	MIN	MIN TO PASS
University Exam	60	24	40
Internal Assessment	40	16	40
PRACTICAL	MAX	MIN	MIN TO PASS
University Exam	40	16	50
Internal Assessment	60	24	50

End Semester Exam Marks : 60 (40% to pass - 24 marks) Internal Assessment Marks : 40 (40% to pass - 16 marks)

Award of Class and Rank

7.5 CGPA and Above – First Class with Distinction (No history of Arrear)
6.5 CGPA to 7.4 CGPA - First Class (Within Minimum Duration Passed in All Subjects)
5.5 CGPA to 6.4 CGPA - Second Class (Within Maximum Duration Passed in All Subjects)

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

(Implemented from the Academic year 2024-2025 onwards)

CURRICULUM OUTLINE

FIRST SEMESTER (FULL TIME)

SL.	Subject	Subject	Hours per week					
No	code	Subject	Theory	Drawing	Tutorial	Practical	Total	Credits
1	40011	Communicative English I	3	-	1	_	4	3
2	40012	Engineering Mathematics I	4	-	2	-	6	4
3	40013	Engineering Physics I	3	-	1	-	4	3
4	40014	Engineering Chemistry I	3	-	1	-	4	3
5	40015	Engineering Graphics I	3	3	-	-	6	3
6	40006	Engineering Physics Practical (semester examination in the second semester)		2	2	2		
7	40007	Engineering Chemistry Practical (semester examination in the second semester)	-	-	-	2	2	2
8	40001	Communication Skill Practical	-	-	-	2	2	2
9	40002	Computer Application Practical	-	-	-	2	2	2
		15	3	8	6	32	24	
Ext	ra / Co- rricular	Physical Education	-				2	0
Ac	tivities	Library					1	0
		Total					35	24

SECOND SEMESTER (FULL TIME)

Sl.	Sl.SubjectNocode		Subject	Hours per week					
No			Bubjeet		Drawing	Tutorial	Practical	Total	Credits
1	40021	Com	municative English II	3	-	1	_	4	3
2	40022	Engi	neering Mathematics II	4	-	2	-	6	4
3	40023	Engi	neering Physics II	3	-	1	-	4	3
4	40024	Engi	neering Chemistry II	3	-	1	-	4	3
5	40025	Engi	neering Graphics II	3	2	-	-	5	3
6	40006	Engineering Physics Practical		-	-	-	2	2	2
7	40007	Engineering Chemistry Practical		-	-	-	2	2	2
8	40028	Basics of Industries and Workshop Practical		2	-	-	3	5	2
			18	5	0	9	32	22	
Extra / Co- Curricular Physical Education		Physical Education					2	0	
	Activities		Library					1	0
]	Total					35	22

III Semester

		HOURS PER WEEK						
Subject Code	SUBJECT	Theory hours	Drawing Hours / Tutorial Hours	Practical hours	Total hours	Credits		
4030310	Electronic Devices and Circuits	4	1	-	5	4		
4030320	Electrical Circuit Theory	4	2	-	6	4		
4030330	Electrical Machines -1	3	2	-	5	3		
4040340	Electronic Devices and Circuits Practical	-	-	4	4	2		
4030350	Electrical Circuits and Machines Practical	-	-	4	4	2		
4030360	Electrical Workshop Practical	-	-	4	4	2		
4030370	Wiring & Winding Practical	-	-	4	4	2		
		11	5	16	32	19		
	Extra / Co-C	urricular	activities					
	Library	_	-	-	1	-		
	Physical Education	_	_	-	2	-		
	TOTAL				35	19		

IV Semester

			HOURS PER WEEK				
Subject Code	Subject Code SUBJECT		Drawing Hours\ Tutorial hours	Practical hours	Total hours	Credits	
4030410	Electrical Machines -II	4	1	-	5	4	
4030420	Measurements, Instruments and Transducers		1	-	4	3	
4030430	Analog and Digital Electronics	4	1	-	5	4	
4030440	E-Vehicle Technology and Policy	3	1	-	4	3	
4030450	Electrical Machines and Instrumentation Practical	-	-	5	5	2	
4030460	Analog and Digital Electronics Practical	-	-	5	5	2	
4030470	Electrical Circuits and Simulation Practical			4	4	2	
			4	14	32	20	
	Extra / Co-Cu	urricular a	activities				
Library		-	-	-	1	-	
	Physical Education	-	-	-	2	-	
	TOTAL				35	20	

V Semeste	er					
			HOURS PER	WEEK		Credits
Subject Code	SUBJECT	Theory hours	Drawing Hours/ Tutorial hours	Practical hours	Total hours	
4030510	Generation Transmission and Switchgear	4	1	-	5	4
4040520	Micro Controller and its Applications	4	1	-	5	4
	Ele	ctive I The	ory			
4030531	Control of Electrical Machines					
4030532	Programmable Logic Controllers	3	2	-	5	3
4030533	Renewable Energy Sources					
	Elec	tive I Prac	tical			
4030534	Control of Electrical Machines Practical					
4030535	Programmable Logic Controller Practical	-	-	5	5	2
4030536	Renewable Energy Sources Practical					
4030540	Computer Aided Electrical Drawing Practical	-	-	4	4	2
4040550	Microcontroller and its Applications Practical	-	-	4	4	2
4040570	Entrepreneurship and Startups			4	4	2
		11	4	17	32	19
	Extra / Co	-Curricula	r activities			
	Library	-	-	-	1	-
	Physical Education	-	-	-	2	-
	TOTAL	1			35	19

VI Semeste	r						
Sh 4			HOURS I	PER WEEK			
Code	SUBJECT	Theory hours	Drawing Hours / Tutorial hours	Practical hours	Total hours	Credits	
4030610	Distribution and Utilization	4	2	-	6	4	
4030620	Energy Conservation and Audit	3	1	-	4	3	
		Elective 1	II Theory				
4030631	Power Electronics						
4030632	Bio-Medical Instrumentation	3	2	-	5	3	
4030633	Computer Hardware and Networks						
4030640	Electrical Estimation and Costing Practical	-	-	5	5	2	
		Elective I	[Practical				
4030651	Power Electronics Practical						
4030652	Bio-Medical Instrumentation Practical	-	-	6	6	2	
4030653	Computer Hardware and Networks Practical						
4020660	Project Work and Internship	-	-	6	6	5	
		10	5	17	32	19	
	Extra	/ Co-Curr	ricular activities				
	Library	-	-	-	1	-	
	Physical Education	-	-	-	2	-	
	TOTAL 35 19						

SCHEME OF EXAMINATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING (FULL TIME)

THIRD SEMESTER

		EXAMI	NATION M.	Min.		
Subject Code	Subject	Internal assessment Marks	Board exam marks	Total marks	Marks for Pass	Exam hours
4030310	Electronic Devices and Circuits	40	60	100	40	3
4030320	Electrical Circuit Theory	40	60	100	40	3
4030330	Electrical Machines -1	40	60	100	40	3
4030340	Electronic Devices and Circuits Practical	60	40	100	50	3
4030350	Electrical Circuits and Machines Practical	60	40	100	50	3
4030360	Electrical Workshop Practical	60	40	100	50	3
4030370	Wiring & Winding Practical	60	40	100	50	3

* Examinations will be conducted for 100 Marks and will be converted to 60 Marks.

FOURTH SEMESTER

		EXAMIN	ARKS	Min		
Subject Code	Subject	Internal assessment Marks	Board exam marks	Total marks	Marks for Pass	Exam hours
4030410	Electrical Machines -II	40	60	100	40	3
4030420	Measurements, Instruments and Transducers	40	60	100	40	3
4030430	Analog and Digital Electronics	40	60	100	40	3
4030440	E-Vehicle Technology and Policy	40	60	100	40	3
4030450	Electrical Machines and Instrumentation Practical	60	40	100	50	3
4030460	Analog and Digital Electronics Practical	60	40	100	50	3
4030470	Electrical Circuits and Simulation Practical	60	40	100	50	3

* Examinations will be conducted for 100 Marks and will be converted to 60 Marks.

FIFTH SEMESTER

		EXAMI	EXAMINATION MARKS			
Subject Code	SUBJECT	Internal assessment Marks	Board exam marks	Total marks	Marks for Pass	Exam hours
4030510	Generation transmission and Switchgear	40	60	100	40	3
4030520	Micro Controller and its Applications	40	60	100	40	3
	Elec	ctive I Theory	,			
4030531	Control of Electrical Machines	40	60	100		
4030532	Programmable Logic Controllers	40	60	100	40	3
4030533	Renewable Energy Sources	40	60	100		
	Elec	tive I Practica	վ			
4030534	Control of Electrical Machines Practical	60	40	100		2
4030535	Programmable Logic Controller Practical	60	40	100	50	3
4030536	Renewable Energy Sources Practical	60	40	100		3
4030540	Computer Aided Electrical Drawing Practical	60	40	100	50	3
4030550	Microcontroller and its Applications Practical	60	40	100	50	3
4030570	Entrepreneurship and Startups	60	40	100	50	3

* Examinations will be conducted for 100 Marks and will be converted to 60 Marks.

SIXTH SEMESTER

Subject SUB IE CT		EXAMI	EXAMINATION MARKS			
Code	SUBJECT	Internal assessment Marks	Board exam marks	Total marks		
4030610	Distribution and Utilization	40	60	100	40	3
4030620	Energy Conservation and Audit	40	60	100	40	3
	Elec	tive II Theory				
4030631	Power Electronics	40	60	100		
4030632	Bio-Medical Instrumentation	40	60	100	40	3
4030633	Computer Hardware and Networks	40	60	100		
4030640	Electrical Estimation and Costing Practical	60	40	100	50	3
	Elect	ive II Practica	1			
4030651	Power Electronics Practical	60	40	100		
4030652	Bio-Medical Instrumentation Practical	60	40	100	50	3
4030653 Computer Hardware and Networks Practical		60	40	100		J
4030660	Project Work and Internship	60	40	100	50	3

* Examinations will be conducted for 100 Marks and will be converted to 60 Marks.

SEMESTER - I DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS

(Implemented from the Academic year 2024-2025 onwards)

Course Name	:	All branches of Diploma in Engineering and Technology
Subject Code	:	40011
Semester		: I
Subject Title	:	COMMUNICATIVE ENGLISH – I

TEACHING AND SCHEME OF EXAMINATION

No of	weeks	per	semester:	16
110 01	eeno	Per	bennester.	10

	Insti	ructions	Examination			
Subject	Hound	Hound/		Duration		
Subject	Week	Semester	Internal Assessment	Board Examinations	Total	Duration
COMMUNICATIVE ENGLISH – I	4	64	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and will be reduced to 60 marks.

Topics and Allocation of Hours

No. of weeks per semester: 16

Unit	Topics	Time (Hrs.)
Ι	Functional Grammar and Usage	14
II	Vocabulary Enrichment	12
III	Situational English	12
IV	Creative English	14
V	English for Scholarly Presentation/ Fluency	12
	Total	64

RATIONALE:

• With the advent and supremacy of the Internet, smart phones, e-Commerce and Social Media in global communication, English has metamorphosed itself with new dimensions to get the communicator's thoughts, feelings and interactions dressed in alien colors.

• To execute the tasks in the Technical Environment, whether academic, professional or social, proficiency in English plays a vital role and a requisite for communication skills has gained momentum both for e-communication, higher studies abroad and placement in MNCs.

• Amazing and inconceivable developments in technology have led various industries to coin and employ their own new words every day and hence revision of syllabus, especially to cater to the need for essential updated vocabulary has become inevitable.

• In addition to the retention of certain functional grammar parts to attest accuracy in communication, new components such as vocabulary enrichment, situational English, Creative English and English for Scholarly Presentation have been introduced to equip the learners to cope up with revamping technical scenarios.

OBJECTIVES:

At the completion of the study of I and II semesters, the students will be able to

- Apply functional grammar to produce pristine presentations in English.
- Carry out effective interaction with the aid of formation of interrogatives.
- Enrich his/her vocabulary to cater to the needs of changing linguistic requirements.

• Understand and respond to the e-content available elsewhere in academic, professional and social environments.

- Understand and review e-books, movies and TV programmes and post his/her reviews online.
- Execute dialogues with his/her friends, teachers and colleagues in day-to-day situations.

• Describe and interpret visuals, images, and machine drawings, events in books and on the Net. Understand, acquire and employ new structures in scholarly presentations with an exposure to works of Great personalities.

• Communicate effectively with idioms and phrases appropriate to real-life situations.

40011 COMMUNICATIVE ENGLISH I DETAILED SYLLABUS

Contents: Theory

Functional Grammar and Usage Parts of Speech Functional Units Use of Main Verb & Auxiliary Verb I Application of Tense Forms (Simple Present, Present Continuous, Present Perfect, Simple Past, Past Continuous, Past Perfect, Simple Future, Future Continuous only) 14 Framing Yes / No Questions Framing Wh -Questions Application of Active Voice and Passive Voice 14 Use of Prepositions Vocabulary Enrichment 14 Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective II 25 Collocations) 12 Homophones (selective 25 homophones) One-word Substitution (Textual) 14 Idiomatic expressions for Daily Life (frequently used 25 expressions) 12 Frequently Used Phrasal verbs (selective 25 Phrasal verbs) 12 Dialogue for Day to Day Situations Short Messages for e-Communication 12 Letter Writing for Academic Purpose (Leave Application, Requisition for Bonafide Certificate, Applying for TC) 12 Writing the Essentials Comprehension 14 IV Review Writing (Book / Movie / TV Program) Visual Description 14 Transforming Verbal Passage into Graphics 14	Unit	Name of the Topics	Hours	
Parts of Speech Functional Units Use of Main Verb & Auxiliary Verb I Application of Tense Forms (Simple Present, Present Continuous, Present Perfect, Simple Past, Past Continuous, Past Perfect, Simple Future, Future Continuous only) 14 Framing Yes / No Questions Framing Wh -Questions Application of Active Voice and Passive Voice 14 Use of Prepositions Vocabulary Enrichment 14 Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective II 25 Collocations) 12 Homophones (selective 25 homophones) One-word Substitution (Textual) 14 Idiomatic expressions for Daily Life (frequently used 25 expressions) 12 Frequently Used Phrasal verbs (selective 25 Phrasal verbs) 12 Situational English Dialogue for Day to Day Situations Short Messages for e-Communication 12 III Creative English 12 Virting the Essentials Comprehension 12 IV Review Writing (Book / Movie / TV Program) Visual Description 14 IV Review Writing Word Cloud 14 Transforming Verbal Passage into Graphics 14		Functional Grammar and Usage		
I Use of Main Verb & Auxiliary Verb 14 Application of Tense Forms (Simple Present, Present Continuous, Present Perfect, Simple Past, Past Continuous, Past Perfect, Simple Future, Future Continuous only) 14 Framing Yes / No Questions Framing Wh -Questions Application of Active Voice and Passive Voice 14 Use of Prepositions Vocabulary Enrichment 14 Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective 25 Collocations) 12 II 25 Collocations) 12 Homophones (selective 25 homophones) One-word Substitution (Textual) 13 Idiomatic expressions for Daily Life (frequently used 25 expressions) 12 Frequently Used Phrasal verbs (selective 25 Phrasal verbs) 12 Situational English 14 Dialogue for Day to Day Situations Short Messages for e-Communication 12 III Exerctificate, Applying for TC) 12 Writing the Essentials Comprehension 12 IV Review Writing (Book / Movie / TV Program) Visual Description 14 IV Advertisement Writing Word Cloud 14 Transforming Verbal Passage into Graphics 14		Parts of Speech Functional Units		
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Simple Past, Past Continuous, Past Perfect, Simple Future, Future Continuous only) Framing Yes / No Questions Framing Wh -Questions Application of Active Voice and Passive Voice Use of Prepositions Vocabulary Enrichment Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective II 25 Collocations) Homophones (selective 25 homophones) One-word Substitution (Textual) Idiomatic expressions for Daily Life (frequently used 25 expressions) Frequently Used Phrasal verbs (selective 25 Phrasal verbs) Situational English Dialogue for Day to Day Situations Short Messages for e-Communication Letter Writing for Academic Purpose (Leave Application, Requisition for Bonafide Certificate, Applying for TC) Writing the Essentials Comprehension IV Review Writing (Book / Movie / TV Program) Visual Description Advertisement Writing Word Cloud Transforming Verbal Passage into Graphics	Ι	Application of Tense Forms (Simple Present, Present Continuous, Present Perfect,	14	
Framing Yes / No Questions Framing Wh -Questions Application of Active Voice and Passive Voice Use of Prepositions Vocabulary Enrichment Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective II 25 Collocations) Homophones (selective 25 homophones) One-word Substitution (Textual) Idiomatic expressions for Daily Life (frequently used 25 expressions) Frequently Used Phrasal verbs (selective 25 Phrasal verbs) Situational English Dialogue for Day to Day Situations Short Messages for e-Communication Letter Writing for Academic Purpose (Leave Application, Requisition for Bonafide Certificate, Applying for TC) Writing the Essentials Comprehension IV Review Writing (Book / Movie / TV Program) Visual Description Advertisement Writing Word Cloud Transforming Verbal Passage into Graphics		Simple Past, Past Continuous, Past Perfect, Simple Future, Future Continuous only)		
Application of Active voice and Passive voice Use of Prepositions Vocabulary Enrichment Word Conversion (selective 25 words) Collocation - Noun with Verb, Adjective with Noun (Selective II 25 Collocations) 12 Homophones (selective 25 homophones) One-word Substitution (Textual) 12 Idiomatic expressions for Daily Life (frequently used 25 expressions) 12 Frequently Used Phrasal verbs (selective 25 Phrasal verbs) 12 Situational English Dialogue for Day to Day Situations Short Messages for e-Communication Letter Writing for Academic Purpose (Leave Application, Requisition for Bonafide 12 Writing the Essentials Comprehension 12 IV Review Writing (Book / Movie / TV Program) Visual Description 14 IV Review Writing Word Cloud 14 Transforming Verbal Passage into Graphics 14		Framing Yes / No Questions Framing Wh -Questions		
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Frequently Used Phrasal verbs (selective 25 Phrasal verbs) Situational English Dialogue for Day to Day Situations Short Messages for e-Communication Letter Writing for Academic Purpose (Leave Application, Requisition for Bonafide Certificate, Applying for TC) Writing the Essentials Comprehension IV Review Writing (Book / Movie / TV Program) Visual Description Advertisement Writing Word Cloud Transforming Verbal Passage into Graphics		Idiomatic expressions for Daily Life (frequently used 25 expressions)		
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Comprehension Creative English IV Review Writing (Book / Movie / TV Program) Visual Description 14 Advertisement Writing Word Cloud Transforming Verbal Passage into Graphics 14		Writing the Essentials		
Creative English IV Review Writing (Book / Movie / TV Program) Visual Description 14 Advertisement Writing Word Cloud 14 Transforming Verbal Passage into Graphics 14		Comprehension		
IV Review Writing (Book / Movie / TV Program) Visual Description 14 Advertisement Writing Word Cloud 14 Transforming Verbal Passage into Graphics 14		Creative English		
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Transforming Verbal Passage into Graphics	1,	Advertisement Writing Word Cloud	11	
		Transforming Verbal Passage into Graphics		
English for Scholarly Presentation/ Fluency		English for Scholarly Presentation/ Fluency		
V "A Snake in the Grass" by R.K. Narayan "Of Department of Children" her Francis Department (On His Divideored) 1 12	V	"A Snake in the Grass" by R.K. Narayan	12	
"When I Have Fears" by John Keats		"When I Have Fears" by John Keats		

Reference Books:

<u>Glossaries</u> https://www.engineering-dictionary.com/ https://techterms.com/definition/ http://dictionary.tamilcube.com/ https://www.lexilogos.com/english/tamil_dictionary.htm

<u>Grammar</u>

- 1. Just Enough English Grammar Illustrated, Gabriele Stobbe, McGraw-Hill Osborne Media, 2008
- 2. Visual Guide to Grammar and Punctuation, DK Publishing, 2017
- 3. English Grammar in Use, Raymond Murphy, Cambridge University Press, 2019
- 4. Intermediate English Grammar, Raymond Murphy, Cambridge University Press, Second Edition.
- 5. Essential English Grammar, Raymond Murphy, Cambridge University Press, New edition.

Motivation

- 1. An Autobiography; Or, The Story of My Experiments with Truth, Mahatma Gandhi, Penguin Books, 2001
- 2. You Can Win, Shiv Khera, New Dawn Press, 2004
- 3. Chicken Soup for the Soul, Jack Canfield, Mark Victor Hansen, 2001

Course Name	: All branches of Diploma in Engineering and Technology
Subject Code	: 40012
Semester	: I
Subject Title	: ENGINEERING MATHEMATICS I

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16

	Instr	uctions	is Examination				
	Uoum	Hours /					
Subject	/ Wook	Hours /	Internal	Board	Total	Duration	
	/ WEEK	Semester	Assessment	Examinations	Total		
ENGINEERING	6	06	40	100*	100	2 11.00	
MATHEMATICS I	0	90	40	100	100	э mrs.	

* Examinations will be conducted for 100 marks and will be reduced to 60 marks.

Unit	Topics	Time (Hrs.)		
Ι	Algebra	20		
II	Complex Number	20		
III	Trigonometry	20		
IV	Differential Calculus – I	18		
V	Differential Calculus – II	18		
Total				

TOPICS AND ALLOCATION OF HOURS:

40012 ENGINEERING MATHEMATICS – I DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
	ALGEBRA	
	1.1 MATRICES AND DETERMINANTS:	
	MATRICES:	
	Definition, Concept and Types of Matrices.	
	DETERMINANTS:	
	Determinant of square Matrix of order 2 X 2 and 3 X 3 – singular and non – singular	
	Matrices - simple problems.	
	1.2 APPLICATIONS OF MATRICES AND DETERMINANTS:	
Ι	Co-factor, Adjoint of Matrix, Inverse of Matrix – Rank of a matrix by Determinant	20
	method – Simple problems.	
	1.3 BINOMIAL THEOREM:	
	Introduction - Factorial, Permutation and Combinations - Values of nPr and nCr	
	(results only – not for examination).	
	Statement of Binomial theorem for positive integral index - Applications of binomial	
	theorem. Expansion of Binomial - Finding general term – Middle term – Coefficient	
	of x^n and Term independent of x – Binomial Theorem for rational index up to -3.	

Ш	 COMPLEX NUMBERS 2.1 ALGEBRA OF COMPLEX NUMBERS Introduction – Complex Numbers – Conjugates – Algebra of complex numbers (without geometrical proof), Properties of complex conjugates - Modulus and Amplitude - Polar and Euler form of a complex number – Simple problems. Argand Diagram – Collinear points, four points forming square, rectangle, rhombus and 	
	parallelogram only - Simple problems. 2.2 DE MOIVRE'S THEOREM De Moivre's Theorem (Statement & Applications) – related simple problems. 2.3 ROOTS OF COMPLEX NUMBERS Finding the n th roots of unity – solving the equations of the form $x^n \pm 1 = 0$ where $n \le 7$ - Simple problems.	20
III	 TRIGONOMETRY 3.1 TRIGONOMETRIC IDENTITIES Trigonometric Ratios of sum & difference of two angles – Multiple and Sub multiple angles – Functions of 3A angles – Simple problems. 3.2 INVERSE TRIGONOMETRIC FUNCTIONS Sum and Product Identities - Inverse Trigonometric Functions – Principal value – Properties of Inverse Trigonometric functions – simple problems. 	20

	DIFFERENTIAL CALCULUS – I	
	4.1 LIMITS	
	Definition of Limits, Problems using the following results:	
	(i) $\lim_{\theta \to a} = \frac{x^n - a^n}{x - a} = na^{n-1}, \lim_{\theta \to a} = \frac{x^n - a^n}{x - a} = na^{n-1},$	
	(ii) $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = \lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$,	
TX 7	(iii) $\lim_{\theta \to 0} \frac{\tan\theta}{\theta} = \lim_{\theta \to 0} \frac{\tan\theta}{\theta} = 1$, ($\theta \theta$ in radians) (results only)	
IV	4.2 DIFFERENTIATION	
	The derivative of Function – Differentiation of constant,	18
	x^n , sinx, cosx, tanx, cotx, secx, cosec x, logx, e^x	
	a^{x} , $\sin^{-1}x$, $\cos^{-1}x$, $\tan^{-1}x$, $\sec^{-1}x$, $\csc^{-1}x$ and $\cot^{-1}x$	
	(Formulae only) – Differentiation Rules: $u \pm v, uv, uvw, \frac{u}{v} \pm v, uv, uvw, \frac{u}{v}$	
	4.3 DIFFERENTIATION METHODS	
	Chain rule – Differentiation of Implicit functions – Simple problems.	
	DIFFERENTIAL CALCULUS – II	
	5.1 SUCCESSIVE DIFFERENTIATION	
	Successive differentiation up to second order (parametric form not included).	
V	Definition of differential equation, order and degree, formation of differential	18
	equation - Simple problems.	
	5.2 PARTIAL DIFFERENTIATION - Definition - Partial Differentiation of two	
	variables up to second order only –simple problems.	

Reference Books:

- 1. Higher Secondary +1 Mathematics volume I&II. Tamil Nadu Text Book Corporation.
- 2. Higher Secondary +2 Mathematics Volume I&II. Tamil Nadu Text Book Corporation.
- 3. Engineering Mathematics V. Sundaram, R. Balasubramanian
- 4. Engineering Mathematics I C.B.Gupta ,A.K.Malik, New Age International Publishers, 1st Edition 2008.
- 5. Differential Calculus S. Balachandra Rao, CK Shantha New Age Publishers
- 6. Vectors and Geometry GS. Pandey, RR Sharma, New Age International Publishers.
- 7. Engineering Mathematics I Guruprasad Samanta, New Age International publishers, 2nd Edition 2015.
- 8. Engineering Mathematics Reena Garg, Khanna publishing house, New Delhi, Revised edn. 2018.
- 9. Engineering Mathematics Volume I P. Kandasamy and K. Thilagavathy, S. Chand & Company Ltd.

Board Examination-Question Paper Pattern For all theory subjects except Communicative English I & II and Engineering Graphics I & II.

Note: Clarkes Table and Programmable Calculators are not permitted. Relevant data should be provided in the question paper for solving the problems if any are required. Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked either or. One question from every unit. Answer either A or B. Each question carries 15 marks. A and B have subdivisions. (7 + 8)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1 = 5 Marks
PART B Short answer type questions Question Number 6 to 20	5 X 2= 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X 15 = 75 Marks
TOTAL	100 Marks *

Note: Board Examinations will be conducted for 100 Marks and converted to 60 Marks.

Course Name: All branches of Diploma in Engineering and TechnologySubject Code: 40013Semester: ISubject Title: ENGINEERING PHYSICS I

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination				
Subject	Houng /	Hours / Semester	Marks				
Subject	Week		Internal Assessment	Board Examinations	Total	Duration	
ENGINEERING PHYSICS I	4	64	40	100*	100	3 Hrs.	

* Examinations will be conducted for 100 marks will be reduced to 60 marks

Topics and Allocation of Hours:

Unit	Topics	Time (Hrs.)
Ι	S I UNITS AND STATICS	13
II	PROPERTIES OF MATTER	13
III	DYNAMICS- I	13
IV	DYNAMICS- II	13
V	SOUND AND MAGNETISM	12
	Total	64

40013 ENGINEERING PHYSICS – I

DETAILED SYLLABUS

Unit	Name of the Topics	Hours
	S I UNITS AND STATICS 1.1 UNITS AND MEASUREMENTS: - Unit – Definition – Fundamental Quantities – Definition – Seven fundamental quantities; their SI units and symbol for the units – Supplementary quantities – plane angle and solid angle; their SI units and symbol for the units Derived physical quantities. Dimensional formula for length, mass and time-derivation of dimensional formula for area, volume, density, velocity, momentum, acceleration, force, impulse, work or energy and power. Uses of Dimensional formula. Conventions followed in SI Units Multiples & sub-multiples and prefixes of units – Unit conversions (HorsePower to watt & calorie to joule) – Applications of the method of dimensional analysis.	
Ι	1.2 STATICS: - Scalar and vector quantities – Definitions and examples – Concurrent forces and coplanar forces – Definition – Resolution of a vector into two perpendicular components – 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 – Experimental verification of parallelogram law of forces and Lami's theorem. 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 – Experimental determination of mass of the given body using principle of	13

	PROPERTIES OF MATTER	
	2.1 ELASTICITY: -	
	Elastic and plastic bodies - Definition - stress, strain - Definitions -	
	Hooke's law - statement - three types of strain - Elastic and plastic limit -	
	Young's modulus, Bulk modulus, Rigidity modulus - Definitions -	
	Uniform and non- uniform bending of beams - Experimental determination	
	of the Young's modulus of the material of a beam by uniform bending	
	method - Poisson's ratio - Simple problems based on stress, strain and	
	Young's modulus – Applications of elasticity.	
	2.2 VISCOSITY: -	
	Viscosity – Definition – Coefficient of viscosity – Definition, SI unit and	
II	dimensional formula – Stream line flow, turbulent flow – Explanation –	13
	Critical velocity – Reynolds number – Definition – Experimental	
	comparison of coefficient of viscosity of two low viscous liquids – Terminal	
	velocity – Definition – Experimental determination of coefficient of	
	viscosity of a highly viscous liquid by Stokes method – Practical	
	2 3 SUDEACE TENSION.	
	Surface tension & angle of contact $-$ Definitions $-$ 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 –	
	Applications of surface tension – Solved problems.	
	DYNAMICS-I	
	3.1. STRAIGHT LINE MOTION: -	
	Introduction-Newton's Laws of motion-Fundamental Equations of motion	
	for objects- horizontal motion-falling freely-thrown vertically upwards.	
	3.2 PROJECTILE MOTION: -	
	Projectile motion, angle of projection, trajectory, maximum height, time of	
	flight, and horizontal range–Definitions-Expressions for maximum height,	
	time of flight and horizontal range–Condition for getting the maximum	
	Simple problems based on expressions for maximum baight time of flight	
	and horizontal range. Examples of projectile motion	
ш	3 3 CIRCULAR MOTION: -	13
	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. Banking of	
	curved paths – Angle of banking – Definition – Expression for the angle of	
	banking of a curved path. $\{\tan \theta = v2 / (r g)\}$ – Simple harmonic motion,	
	amplitude, frequency and period – Definition. Simple problems based on	
	the expressions for centripetal force and angle of banking – Applications of	
	DVNA MICS, H	
	4 1 ROTATIONAL MOTION OF RIGID RODIFS -	
	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	
IV	gyration – Definition – Expression for the kinetic energy of a rotating rigid	13
	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.	
	4.2 GRAVITATION: -	

	 Newton's laws of gravitation – Acceleration due to gravity on the surface of earth – Expression for variation of acceleration due to gravity with altitude 4.3 SATELLITES: - Satellites – Natural and artificial – Escape velocity and orbital velocity – Definitions – Expression for escape velocity and Orbital velocity – Polar and Geostationary satellites – Uses of artificial satellites. Simple problems based on the expressions for escape velocity and Orbital velocity.	
V	 SOUND AND MAGNETISM 5.1 SOUND: - Wave motion – Introduction and definition – Audible range – Infrasonic – Ultrasonics – Progressive waves, longitudinal and transverse waves – Examples – Amplitude, Wave length, period and frequency of a wave – Definitions – Relation between wavelength, frequency and Velocity of a wave – Stationary or standing waves. Vibrations – Free & forced vibrations and resonance – definitions and examples – Laws of transverse vibration of a stretched string – Sonometer – Experimental determination of frequency of a tuning fork. Acoustics of buildings – Echo – Reverberation, reverberation time, Sabine's formula for reverberation time (no derivation) – Coefficient of absorption of sound energy – Noise pollution. Simple problems based on expression for frequency of vibration. Doppler effect – Definition and Applications – Ultrasonic and its uses – SONAR – Solved Problems. 5.2 MAGNETISM: - Pole strength – Definitions – Magnetic moment, intensity of magnetisation, magnetising field intensity, magnetic induction, Permeability, hysteresis, saturation, retentivity and coercivity – Definitions – Method of drawing hysteresis loop of a specimen using a solenoid – Uses of Hysteresis loop. Simple problems based on intensity of magnetization – Types of magnetic materials and their applications – Solved problems. 	12

Reference Books:

- Physics Resnick and Holiday Wisley Toppan publishers–England Engineering Physics B.L.Theraja S. Chand Publishers A textbook of sound R.L. Saighal & H.R. Sarna S.Chand & Co. 1.
- 2.
- 3.
- Mechanics Narayana Kurup S. Chand Publishers. 4.

Board Examination-Question Paper Pattern

For all theory subjects except Communicative English I & II and Engineering Graphics I & II.

<u>Note:</u> Clarkes Table and Programmable Calculators are not permitted. Relevant data should be provided in the question paper for solving the problems if any are required.

Max.Marks:100

Time: 3Hrs.

PART - A Five questions will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked: Either / or type. One question from every unit. Answer either A or B. Each question carries 15 marks.

A and B have subdivisions. (7 + 8)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B	
Short answer type questions	10 X 2 = 20 Marks
Question Number 6 to 20	
PART C	
Descriptive answer type questions	5 V15 – 75 Marka
(Either A or B)	$J \Lambda I J = 7 J$ WIALKS
Question number 21 to 25	
TOTAL	100 Marks *

Note: Board Examinations will be conducted for 100 Marks and converted to 60 Marks.

Course Name :	All bra	nches of Diploma in Engineering and Technology
Subject Code :	40014	
Semester	:	Ι
Subject Title	:	ENGINEERING CHEMISTRY I

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instr	ructions	Examination			
Subject	II	II.a.ung/	Marks			
Subject	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examinations	Total	Duration
ENGINEERING CHEMISTRY I	4	64	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and will be reduced to 60 marks.

Topics and Allocation of Hours:

Units	Topics	Time	
I	Basic concepts in chemistry – Atomic Structure and Chemical bonding,	14	
1	Periodic Table, Acids and Bases	17	
II	Surface Chemistry - Colloids, Nanotechnology, Catalysis	12	
Ш	Minerals and Metallurgy– Metallurgy of Iron, Metallurgy of Tungsten and		
111	Titanium, Powder Metallurgy	12	
IV/	Industrial Chemistry – Nuclear Chemistry, Cement, Ceramics,		
1 V	Refractories and Glass	14	
V	Chemistry of Engineering Materials – Polymer, Abrasives, Composite	10	
v	Materials	12	
Total			

RATIONALE:

The subject Engineering Chemistry I lay the foundation of all the elements, structure and periodic classification. The latest trends on nanotechnology, its application on various fields of engineering is also dealt with. It provides basic concepts about minerals and its resources, the metal extraction, heat treatment and powder metallurgy. It also imparts knowledge about few Engineering Materials like cement, ceramics, refractory and glass. It also deals with polymers, abrasives and composite materials.

OBJECTIVES:

The objective of this Course is to make the student:

- 1. Know about atomic structure, chemical bonding, periodic classification and acids and bases.
- 2. Learn about surface chemistry, colloidal particles and nano-particles and their application.
- 3. Know about the mineral resources of Tamil Nadu and the fundamentals of metal extraction, iron and steel manufacture, heat treatment and powder metallurgy.
- 4. Study about the importance of Engineering Chemistry in industry.

5. Know about Engineering materials like cement, ceramics, refractory, glass, rubber, plastic and composites.

40014 ENGINEERING CHEMISTRY I DETAILED SYLLABUS

Contents: Theory

Units	Name of the Topics	Hours

	BASIC CONCEPTS IN CHEMISTRY	
	1.1 Atomic Structure and Chemical bonding, Periodic Table, Acids and Bases	
	Fundamental particles – proton – electron – neutron – atomic number – mass	1
	number – extra nuclear part – filling up of electrons – aufbau principle –s–p–	1
	d– f orbitals – electronic configuration – definition of atomic mass, molecular	
	mass, equivalent mass, valency (definitions only) – octet rule – electrovalent	
	bond – sodium chloride formation covalent bond – formation of ammonia.	
Ι	1.2 Periodic Table	
	Modern periodic law – periodic classification of elements – features of modern	
	periodic table – properties of s–p–d–f block elements.	14
	1.3 Acids and Bases	
	Properties of acids and bases – Lewis concept of acids and bases –	
	advantages – pH and pOH – Definition – Numerical problems –	
	Indicator – Definition – Buffer solution – Definition – Types of buffer	
	solution with examples – Application of pH in industries	

	SURFACE CHEMISTRY	
	2.1 Colloids	
	Colloids – Definition – True solution and Colloidal solution –	
	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,	
TT	Cleansing action of soap, Sewage disposal – tanning – and artificial rain.	
11	2.2 Nanotechnology	
	Nanoparticles – definition – properties – application of Nanotechnology –	12
	Engineering – medicine – biomaterial.	12
	2.3 Catalysis	
	Catalyst – Definition – Positive – Negative catalyst – Definition – Types of	
	catalysis – Homogeneous and Heterogeneous – Promoter – Catalyst poison –	
	active center – Definition – Characteristics of a catalyst – Industrial	
	applications of catalysts.	
	MINERALS AND METALLURGY	
	3.1 Minerals and Metallurgy	
	Mineral – Minerals of Tamil Nadu – Sources and Uses (Basic concepts only) -	
	Extraction of iron – Blast furnace – cast iron – steel manufacture – Bessemer	
TTT	converter – neat treatment of steel – nardening – annealing – tempering.	
111	5.2 Metanurgy of Tungsten and Titanium	10
	2.3 Dowdon Motollyngy	12
	5.5 Fowder Metallurgical process Preparation of Metal Dowder	
	Atomization Reduction of Metal Oxide blending compacting sintering	
	- finishing - Applications of Powder Metallurgy	
	INDUSTRIAL CHEMISTRY	
	4.1 Nuclear Chemistry	
	Nuclear reaction – Differences between nuclear reaction and ordinary chemical	
	reaction – Radioactive decay – alpha emission – beta emission – gamma	
	emission – half-life period – simple problems– Nuclear fission - nuclear fusion	
IV	- chain reaction - components nuclear reactor, reactor core, nuclear reactor	1.4
	coolant, Control rods, neutron moderator – steam turbine – Application of	14
	radioactive isotopes.	
	4.2 Cement and Ceramics	
	Definition - Manufacture of Portland Cement - Wet Process - Setting of	
	Cement (No equation) - Ceramics - White pottery - Definition - Manufacture	

	of White pottery – Uses – Definition of glazing – purpose – Method – Salt	
	glazing – liquid glazing.	
	4.3 Refractories and Glass	
	Definition – requirements of a good refractory – types with examples and uses	
	– uses of silica, fire clay and alumina. Composition of Glass – Manufacture of	
	Glass – annealing of glass – varieties of glass – Optical glass, windshield glass	
	and Photochromic glass.	
	CHEMISTRY OF ENGINEERING MATERIALS	
	5.1 Polymer	
	Definition – Natural polymer – Rubber – Defects of natural rubber -	
	Compounding of rubber – Ingredients and their functions – Vulcanization -	
	Plastics – types – Thermoplastics and Thermoset plastics – Differences	
	Mechanical properties of plastics – Polymers in Surgery – Biomaterials –	
	Definition – Biomedical uses of Polyurethane, PVC, Polypropylene and	
V	Polyethylene.	10
	5.2 Abrasives	12
	Definition – classification – hardness in Moh's scale – Natural abrasives –	
	Diamond, Corundum, Emery and Garnet. Synthetic abrasives – Carborundum	
	– Boron carbide manufacture – properties and uses.	
	5.3 Composite Materials	
	Definition – examples – Classification of composites – Advantages over metals	
	and polymers – General application	

Reference Books:

 Introduction to Engineering Chemistry, Shradha Sinha , S Dara & Sudha Jain, S.Chand Publishers, 2004.

2. S.Chand's Engineering Chemistry, S S Dara, Sudha Jain & Shradha Sinha, 2005.

3. A Textbook of Engineering Chemistry, Dr. Uday Kumar, 2013.

4. Chemistry – Higher Secondary – 1st and 2nd year, Vol. I & II, Tamil Nadu Text Book Corporation, 2018.

5. Engineering Chemistry Fundamentals and Applications, Shikha Agarwal, Cambridge University Press, 2019.

6. Government of India, Geological Survey of India, Geology and Mineral Resources of The States of India Part VI – Tamil Nadu and Pondicherry

7. Indian Minerals Yearbook 2011, Government of India Ministry of Mines, Indian Bureau of Mines India Bhavan, Civil Lines, Nagpur – 440 004

Website references:

1. https://bookboon.com/en/fundamentals-of-chemistry-ebook

Board Examination-Question Paper Pattern For all theory subjects except Communicative English I & II and Engineering Graphics I & II.

Note: Clarkes Table and Programmable Calculators are not permitted.

Relevant data should be provided in the question paper for solving the problems if any are required. Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART- C Five questions will be asked either / or type. One question from every unit Answer either A or B. Each question carries 15 marks.

A and B have subdivisions. (7 + 8)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weight age.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions Question Number 6 to 20	10 X 2 = 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X15 = 75 Marks
Total	100 Marks*

Note: Board Examinations will be conducted for 100 Marks and converted to 60 Marks.

Course Name : All branches of Diploma in Engineering and Technology

Subject Code : 40015 : I

Semester

Subject Title : ENGINEERING GRAPHICS I

TEACHING AND SCHEME OF EXAMINATION

				No of w	eeks per sei	nester: 16
	Instr	uctions]	Examination		
	TT		Marks			
Subject	Week Semester	Hours/ Semester	Internal Assessment	Board Examinations	Total	Duration
ENGINEERING CHEMISTRY I	6	96	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and will be reduced to 60 marks.

Topics and Allocation of Hours:

Units	Topics					
Ι	Drawing Office Practice and Dimensioning	18				
II	Geometric Constructions and Construction of Conics	18				
III	Projection of Points & Straight Lines and Construction of Special Curves	18				
IV	Orthographic Projections	36				
Total						

RATIONALE:

Engineering Graphics is a basic subject for all branches of diploma in engineering and technology. Since engineering drawing is considered as the language of engineers, the proper understanding and practice is required with proper use of instruments.

This subject is aimed at providing basic understanding of the fundamentals of Engineering Graphics; mainly visualization, graphics theory, standards of drawings, the tools of drawing and the use of drawings in engineering applications.

The topics covered are based on the syllabus for diploma studies in engineering. The subject is planned to include sufficient practices which would help the student in visualization of two-dimensional objects and developing the drawing.

The chapters are arranged in sequence and starts from the basic concepts of lettering, dimensioning, geometrical constructions, and conic sections, projection of points and straight lines, construction of engineering curves, proceeds to the orthographic projection techniques. By learning this subject, it is expected that the students would be matured to visualize the engineering components by reading an engineering drawing.

OBJECTIVES:

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

- Understand the importance of drawing •
- Identify and use the drawing instruments •
- Practice the rules and methods of dimensioning •
- Acquire knowledge about geometric constructions •
- Construct conic curves
- Understand the concepts of projection of points and straight lines •
- Acquire knowledge about the construction of special curves
- Draw orthographic views from the given pictorial drawing

Note: While practicing, usage of drawing instruments like drawing board, mini drafter, compass, divider, drawing clips / cello tape, H, 2H and HB grade drawing pencils, eraser etc., are mandatory for class work and examinations. Size of drawing sheet recommended: A2 size (420 x 594 mm). Use both sides of drawing sheets for practice.

40015 ENGINEERING GRAPHICS - I **DETAILED SYLLABUS**

ΤI

I Luit	Nome of the Torrise	Harris			
Unit	Name of the Topics	Hours			
	DRAWING OFFICE PRACTICE AND DIMENSIONING				
	Importance of engineering drawing as a graphic communication-drawing practice as per BIS code-drawing instruments: drawing board, mini-drafter, compass, divider, protractor, drawing sheets, drawing pencils, set squares etc., – title block- layout and folding of drawing sheets. Lettering and numbering as per BIS –importance of legible lettering and numbering- single stroke letters-uppercase and lowercase letters-slanting/ inclined letters-general procedures for lettering and numbering-height of letters-guidelines-practices. Scales-full size scale, reducing scale and enlarging scales (Description only).				
	Minimum criteria for Class assessment	7			
	No. of Drawing Sheets No. of Exercises	\neg			
I.	1 Upper case, lower case, slanting letters and numerals – each 5 sentences with different heights				
	1.2 Dimensioning Dimensioning – need for dimensioning–dimensioning terms and notations as per BIS dimension line, extension line and leader line – dimensioning systems – methods placement of dimensions – uni-directional and aligned systems – important dimensioning rules –dimensioning of common features – diameters, radii, holes, chamfers – addition of letters and symbols – parallel, chain and progressive dimensioning – practice dimensioning the given drawing as per BIS code (one view of the object). Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises 1 8 - 2D drawings	S – of ing ion of			
	GEOMETRIC CONSTRUCTIONS AND CONSTRUCTION				
	OF CONICS				
П.	 2.1 Geometric Constructions Bisect a straight line – bisect an arc – bisect an angle – divide a straight line into a number of equal parts – divide the circle into a number of equal divisions – construct arc touching two lines at any angle – construct an arc touching two arcs. Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises covering all methods 1 10 2.2 Construction of Conics Conic sections – definition of locus, focus, directrix, axis, vertex and eccentricity practical applications of ellipse, parabola and hyperbola. Ellipse: Construction of ellipse by concentric circle method, rectangular method when and minor axis is given and eccentricity method when focus and directrix a given–exercises in practical applications. Parabola: Construction of parabola by rectangular method, when focus and directrix a given – exercises in practical applications.	iny an 18 7 - ien are are			

	Hyperbola: Construction of hyperbola by eccentricity method when focus and directrix								
	are gi	are given – exercises in practical applications.							
	Minimum criteria for Class assessment								
		N	lo. of Drawing Sheets	5	No	. of Exercises coverin	ng all method	ls	
			2			07			
	PF	ROJE	CTION OF POINTS	5 & ST	RAI	GHT LINES AND	CONSTRUC	CTION	
			0	F SPE	CIA	L CURVES			
	3.1 Projection of Points and Straight Lines								
	Proje	ction o	of points – position of	a poin	t on	four quadrants and or	n the referenc	e planes –	
	system	m of n	otation-Place a point	on fou	ır qua	drants with different	distances – e	exercises.	
	Proje	ction o	f straight lines-line in	n the fi	rst qu	adrant and on the ref	erence planes	s – parallel	
	to one	e plane	e and perpendicular to	o other	[.] plan	e – inclined to one p	lane and para	allel to the	
	other	plane	– parallel to both the	planes	-sin	ple exercises.			
ш			Minimu	m crite	eria fo	or Class assessment			
111.			No. of Drawing	Sheets		No. of Exerc	ises		18
			2			12			10
	3.2 C	onstru	iction of Special Cul	rves					
	Defin	ition a	nd construction of cy	ycloid -	– epi	cycloid – hypocycloi	id – involute	of a circle	
	– Archimedean spiral for one revolution – helix – practical applications – exercises.								
	Minimum criteria for Class assessment								
		N	o. of Drawing Sheets	5	No	. of Exercises covering	ng all method	ls	
			2			06			
	ORTHOGRAPHIC PROJECTIONS								
	4.1 First Angle Projections: Simple components								
	Introduction – projection terms –orthographic projection – planes of projection –								
	principal orthographic views – designation of views – four quadrants – first angle								
	projection – third angle projection – symbols and arrangement of views for first angle								
	and third angle projections –comparison –Simple exercises in first angle projection with								
	minimum two views of simple components (without curves and circles).								
		Minimum criteria for Class assessment							
IV.			No. of Drawing	Sheets		No. of Exerc	ises		36
	1 6								
	4.2 First Angle Projections only: Engineering components								
	Draw the projections of the simple engineering components using first angle projection								
	- exercises in drawing orthographic views - three views-front view, top view and right /								
	left side views. (For Board Examinations any two views can be asked.)								
	Minimum criteria for Class assessment								
	No. of Drawing Sheets No. of Exercises								
			3			12			

Reference Books:

- Bhatt N.D, "Engineering Drawing", Charotar Publishing House Pvt. Ltd. 1.
- Gill P.S, "Engineering drawing", S.K.Kataria&Sons 2.
- Gopalakrishna.K.R., "Engineering Drawing", (Vol 1 & 2 combined), Subhas Publications. 3.
- 4.
- Venugopal. K, Prabhu Raja V, "Engineering Graphics", New Age International Natarajan K V "A Textbook of Engineering Drawing and Graphics" N Dhanalakshmi 5.

ENGINEERING GRAPHICS I PORTIONS FOR ASSESSMENT TEST

Assessment Test 1

Portion: Unit I and II

Duration: 2 Hrs.

Question pattern

Max. Marks: 50

Part A

• Three questions will be asked.

- Answer any two questions.
- Each question carries five marks.
- Minimum one question should be asked from each unit in the first chapter.

(Chapter 1.1 and 2.1)

Part B

- Three questions will be asked.
- Answer any two questions.
- Each question carries twenty marks.
- Minimum one question should be asked from each unit second chapter.

(Chapter 1.2 and 2.2)

Portion: Unit III and IV

Assessment Test 2

Question pattern

Duration: 2 Hrs.

Part A

- Three questions will be asked.
- Answer any two questions.
- Each question carries five marks.
- Minimum one question should be asked from each unit in the first chapter.

(Chapter 3.1 and 4.1)

Part B

(2 X 20 = 40)

 $(2 \times 5 = 10)$

 $(2 \times 20 = 40)$

- Three questions will be asked.
- Answer any two questions.
- Each question carries twenty marks.
- Minimum one question should be asked from each unit second chapter.

(Chapter 3.2and 4.2)

Internal Assessment Marks:

Description	Marks
Class Assessment Sheets (Minimum 10 Sheets)	10
Average of Two Assessment Tests	10
Model Examination	10
Attendance	10
Total	40

Max. Marks: 50

(2 X 5 = 10)

BOARD EXAMINATION QUESTION PAPER PATTERN

Time: 3 Hrs.

Max. Marks: 100

Note: 1. Answer all the questions only in the drawing sheet.2. Assume missing dimensions suitably, if required.3. Proper drawing instruments and board should be used

$Part - A \qquad (4x5 = 20)$

Note: Five questions will be asked (Sl. No: 1 to 5). Answer any four questions. Each question carries five marks. Minimum one question should be asked from each unit in the first chapter. (Chapters: 1.1, 2.1, 3.1, 4.1)

Part – B (4x20 = 80)

Note: Six questions will be asked (Sl. No: 6 to11). Answer any four questions. Each question carries twenty marks. Minimum one question should be asked from each unit second chapter. (Chapters: 1.2, 2.2, 3.2, 4.2)

- Course Name : All branches of Diploma in Engineering and Technology
- Subject Code : 40001
- Semester : I Circuit Branches & II Non-Circuit Branches

Subject Title : COMMUNICATION SKILL PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16

Subject	Instructions		Examination			
COMMUNICATION	Hours /	Hours /	Marks			
	Mook		Internal	Board	Total	Duration
	WEEK	Semester	Assessment	Examinations	Total	
FRACIICAL	2	32	60	100*	100	2 Hours

* Examinations will be conducted for 100 marks and will be reduced to 40 marks.

Unit	Topics	Time (Hrs.)	
Ι	Listening Skill	10	
II	Reading Skill	6	
III	Speaking Skill	10	
IV	Writing Skill	6	
Total 32			

RATIONALE:

1.3 "The quality of your life is in the quality of your communication" opined Antony Robins. Language is the means of self-expression and one of the prime tools for communication. Communicative fluency augments one's personal, academic, social and professional life.

1.4 The present syllabus, focusing on four Communication Skills, viz. Listening, Reading, Speaking and Writing, enables the students at Diploma level gain confidence and fluency in communication which in turn would enhance them face their career commitments with globalized standards.

OBJECTIVES:

At the completion of the study, the students will be able to

> Improve their auditory skills to attentively listen, effectively comprehend and to identify important information and keywords.

> Fine tune their reading skills and make them articulate lucidly with proper stress and intonation

> Perfect their reading comprehending skills using techniques like Skimming to get the general idea and scanning to grasp specific information.

- > Pronounce words with renewed confidence.
- Express their needs, obligations, suggestions, gratitude and apology with poise and conviction.
- > Introduce themselves and others in a self-assuring manner.
- > Partake in face to face conversation with skilled agility.
- > Emphatically write and complete the missing parts.
- Acquire a sound knowledge on the usage of non-verbal communication.

40001 COMMUNICATION SKILLS PRACTICAL DETAILED SYLLABUS

Contents: Practical

Unit	Name of the Topics	Hours
Ι	Listening Skill Listening to Speeches by Great Speakers/ TV News (Assessment Through note taking) Listening to Short Stories (Assessment by Vocabulary Check) Listening to Indian / British / American English (Assessment by Cloze)	10
II	Reading SkillStress & IntonationTongue Twisters / Tongue Modulators Frequently Mispronounced WordsReading Newspaper – (Skimming & Scanning)	06
III	Speaking Skill Polite Expressions (Greeting, Requesting, Thanking, Apologizing, Opinions, Suggestions) Introducing Yourself/ Friends/ Family Recite - quotes of Leaders / Scholars / Scientists Face to Face Conversation	10
IV	Writing Skill Thought Fillers Completing an Incomplete Story How to prepare PPT Non-Verbal Communication	06

Note:

BOARD PRACTICAL EXAMINATIONS

1. The students should be given proper practice in all the exercises. All the exercises should be completed before the examinations.

2. The students should maintain a record notebook. The record note book should be submitted during the Board Practical Examinations.

3. The external examiner should verify the availability facility for the batch strength before the commencement of Practical Examination.

4. PART D should be conducted first for all the students. Part A, Part B and Part C can be conducted by both examiners by dividing the students into two groups.

Part a - Listening (No. of Exercises: 3, Duration: 45 min.)

Question No.1: The examiner shall play either the audio of the speech of a great speaker or that of TV news running from 3 to 5 min. The audio can be played twice. The candidates may be given 10 minutes to take notes as directed in the question paper.

Question No.2: A short story selected by the external examiner shall be played only once without transcript. The objective of this exercise is to test the Listening ability of the candidate and therefore questions should be framed accordingly in the pattern of question and answer. The time to complete this exercise is 5 minutes.

Question No.3: Any one of the audios (British English, American English or Indian English) may be selected by the external examiner and the same shall be played only once. Maximum of 5 questions for filling in the blanks may be given and the candidates may be provided a maximum of 10 minutes to answer the questions.

This part shall be completed within 45 minutes including the time used for playing listening audios.

Part – B – Reading (No. of Exercises 3, Duration: 45 min.)

Each batch may be divided into two. Both examiners may engage all the students.

Question No. 1: Read out the tongue twister.

Question No. 2: A passage from the newspaper can be given for reading.

Question No. 3: Pronounce the words correctly. Part B shall be completed within 45 minutes.

Part – C – Speaking (No. of Exercises: 4, Duration: 45 min)

Divide the students to make it convenient for conversations in English by a pair. Both examiners can handle it.

Question No. 1: Polite expressions for the context provided.

Question No. 2: Self-introduction for the interview.

Question No.3: Any five quotes can be recited from the given list of quotes of Leaders, Scholars and Scientists.

Question No. 4: The candidates have to speak as directed by the concerned examiner. All the questions are mandatory. Part C shall be completed within 45 minutes.

Part - D – Writing (No. of Exercises: 3, Duration: 45 min.)

All students should appear for this part.

Question No.1: Five questions with blanks shall be asked based on a list of 25 frequently used thought fillers already trained during lab classes.

Question No. 2: shall consist of an unknown incomplete story providing scope for further development and application of imagination. (Minimum 3 lines for completion with suitable title and moral)

Question No. 3: Questions can be taken from a list of fifteen important questions covering the core areas of non-verbal communication. (Five out of eight questions to be answered)

Students shall be provided a maximum of 30 minutes to complete Part-D.

DETAILED ALLOCATION OF MARKS

	Description	Marks
Α	Listening	30
В	Reading	20
С	Speaking	30
D	Writing	20
	Total	100

Guidelines for Conduct of Practical Classes and Writing Record Note:

There are 13 experiments in total equally distributed to each skill as follows:

Sl. No. Name of the exercise		Minimum Exercises to be Practiced / written in Record Note				
	Listening Skill					
1	Listening to Speeches by Great Speakers/ TV News	Each One exercise				
2.	Listening to Short Stories	Minimum of two exercises				
3.	Listening to Indian / British / American English	Minimum of two exercises				
	Reading Skill					
4.	Reading Tongue Twisters	A list of 25 tongue twisters				
5.	Reading English Newspapers	Minimum 2 passages from any English Newspaper				
6.	Frequently mispronounced words	List of 25 words				
Speaking Skill						
7.	Making Polite Expressions	Polite expressions- Greeting, Requesting, Thanking, Apologizing, Opinions, Suggestions				
8.	Introducing oneself / friends/family	Minimum two exercises for introducing oneself and introducing others				
9.	Reciting quotes	Quotes of Leaders/Scholars/Scientists				

		(List of 25 quotes)
10	Face to face conversation	Minimum two exercises
	Writing Skill	
11	Use of Thought Fillers	A list of 25 frequently used thought fillers
12	Completing an Incomplete Story	Minimum of two exercises. (conclusion – minimum 3 lines, title & moral)
13	Non-Verbal Communication	A list of 10 questions and answers relating to non- verbal communication.

Notes:

1. Each experiment shall be awarded 20 marks and the total marks secured in all experiments shall be averaged to 20 marks.

- 2. Attendance marks shall be calculated for 5 marks as per the given norms.
- 3. Total internal mark is 40 (Record 30 marks + Attendance 10 marks)
- 4. Observation note is not applicable for this practical.
- 5. Listening Skill Exercises:

• For each exercise under Listening Skill, minimum exercise should be provided for practice and should be recorded in the record note. (As per the tabular column)

- Open sources available online on the sites such as
- www.youtube.com,
- www.letstalk.co.in,
- http://www.bbc.co.uk/learningenglish/english/features/6-minute-english, and
- https://esl-lab.com/,
- Can be utilized for sessions on improving listening skill.

Note:

Since there is no observation note for English Communication Practical, the worksheets practiced by the students should be preserved along with the Record Note.
$Course \ Name \ : All \ branches \ of \ Diploma \ in \ Engineering \ and \ Technology$

Subject Code : 40002

: Non-Circuit Branches & II Circuit Branches

Semester Subject Title

: COMPUTER APPLICATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
Subject	Hanna	Hanna /	Marks			
Subject	/ Wook	Somostor	Internal	Board	Total	Duration
	/ WEEK	Semester	Assessment	Examinations	Total	Duration
COMPUTER						
APPLICATION	2	32	60	100*	100	3 Hrs.
PRACTICAL						

* Examinations will be conducted for 100 marks will be reduced to 40 marks

|--|

Unit	Topics	Time (Hrs.)		
Ι	BASICS OF COMPUTER	5		
II	WORD PROCESSING	9		
III	SPREADSHEET	9		
IV	PRESENTATION	9		
	Total 32			

40002 COMPUTER APPLICATIONS PRACTICAL

OBJECTIVES

- To learn fundamentals of the computer
- To understand documentation using word processor.
- To understand the spread sheet and its uses.
- To understand the presentation.

Contents: Practical

Units	Topics	Hours
Ι	Basics of Computer: Computer Basics – Hardware & Software - General understanding of various computer hardware components – CPU – Memory – Display – Keyboard- Mouse - HDD & Other Peripheral Devices – Types of Software – Application Software & System Software.	5
II	Word Processing: Creating new document – Opening an existing document – Edit & Save a document – Typing a text – Deleting a text – Inserting a text – Finding a text – Replacing a text – Copying & Moving a text – Selecting Font & Font Size – Justifying Texts – Bold – Italic – Underline – Strike – Double Strike – Coloring Text – Spell Check – Ruler – Formatting Page – Line Spacing – Margins – Page Size – Page Border – Page Color – Page Columns – Watermark – Page Break – Section Break – Portrait – Landscape – Inserting Symbols, Equations & Shapes – Text Box – Word Art – Hyperlink – Inserting Pictures – Picture Arrangement - Align Objects – Bullets & Numbering – Working with Tables – Header & Footer – Table of Contents – Inserting Page Number – Changing Character width & Line Spacing – Printing the document – Print Preview – Shortcuts for various activities in Word – Exercises.	9
III	Spreadsheet: Creating a new worksheet - Opening an existing worksheet - Editing and Saving a worksheet - Creating, Renaming and Deleting worksheets in a workbook - Types of data like Numeric, text etc Entering in a cell- Manipulation of a cell, row and column (deleting, inserting, finding, replacing, copying and moving) - Justifying in a cell, Merging cells and columns - Addition, Subtraction and using formula - Selecting Font and Font Sizes - Using and manipulating tables, inserting / deleting of rows and columns - Sorting Columns- Using Header and footer, Inserting Page number - Border and Shading of cells, rows and columns - Formatting page, margins,	9

	page size, portrait and landscape - Selecting area for printing, Printing of a worksheet and workbooks, Using print preview - Copy / moving text between two different worksheets and workbooks - Using Chart Wizard, Creation of different types of charts – Protect sheet using password - Shortcuts for various activities in spreadsheet – Exercises.	
IV	Presentations: Creating New Presentations - Opening Presentations - Saving Presentation - Inserting new Slides - Slide Layout - Slide Design - Presentation View - Adding Text - Font formatting - Paragraph formatting – Inserting Clipart & Pictures - Inserting and Manipulating Smart Art - Running a slide show Insert Slide Number - Slide Header & Footer - Applying Slide Animation – Custom Animation - Inserting Shapes - Insert Video & Sound - Insert Action - Hyperlinks - Charts - Tables – Page Setup - Print Preview - Printing - Shortcuts of various activities in presentations – Exercises.	9

EXERCISES

EXERCISE 1 (WORD PROCESSING)

Prepare a report from the given printed document of minimum 250 words. (Use text formatting tools, header & footer, page number, line spacing, font & images)

Page Setup:

Set Margin: Left-1.5, Right-1.5, Top-1.5 & Bottom-1.5 / Orientation: Portrait / Paper Size: A4 / No. of Columns: 2

Page Background Settings:

Watermark / Page Color / Page Borders

• <u>Text & Paragraph Settings:</u>

Title: Font size: 16 - Centered - Bold - Suitable font

Heading: Font size: 14 – Left Aligned – Underlined – Set the Suitable Font Face

Body Text: Font size: 12 – Justified – 1.5 Line Spacing – Set the Suitable Font Face

Header & Footer:

Header – Seminar Name, Name of the student, Reg. No. & Branch

• <u>Insert:</u>

Picture / Clipart / Shapes / Table.

• Minimum No. of Words: 250 words

EXERCISE 2 (WORD PROCESSING)

Create a resume for placement from the given printed template with your personal details. Publish a copy of the resume as PDF.

• <u>Page Setup:</u>

Margin: Left-0.5, Right-0.5, Top-0.5 & Bottom-0.5 / Orientation: Portrait /

Paper Size: A4 / No. of Columns: As per the given resume format.

• <u>Page Borders:</u>

Insert Page Border if required.

• <u>Font & Paragraph:</u>

Heading: Font size: 12 - Bold – Underlined – Set the Suitable Font Face Body

Text: Font size: 12 – Justified – 1 Line Spacing – Set the Suitable Font Face Insert Bullets & Numberings were ever required.

• <u>Insert:</u>

Photo for your Resume / Tables for Academic Records.

• <u>Save as PDF:</u>

Publish a copy of the resume as PDF using any PDF Converting Tools.

EXERCISE 3 (WORD PROCESSING)

Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

• <u>Page Setup:</u>

Margin: Left-1.5, Right-1.5, Top-1.5 & Bottom-1.5 / Orientation: Portrait / Paper Size: A4

Page Background:

Add Page Border for the Letter

• <u>Font & Paragraph:</u>

Title: Font size: 16 – Centered – Bold – Suitable font Heading: Font size: 14 – Left Aligned – Underlined – Set the Suitable Font Face Body Text: Font size: 12 – Justified – 1.5 Line Spacing – Set the Suitable Font Face

• <u>Mailings:</u>

Select Recipients and add a New List of HR Database. Start Mail Merge through Step by Step Mail merge wizard.

EXERCISE 4 (SPREADSHEET)

Create a worksheet for the given relational data (minimum ten records) and show the data in the Line Chart, Bar Chart and Pie Chart.

• <u>10 Records</u>

Add text to the spreadsheet to the various fields require to analyze the data in Chart

<u>Font & Alignment</u>

Font Face - Font Size - Font Color

• <u>Formulae</u>

Use Formulae for the selected data for Calculation

• Insert

Charts – Line Chart, Bar Chart & Pie Chart

EXERCISE 5 (SPREAD SHEET)

Create a worksheet for the given data with various functions like Sum, Average, Count, Min, Max & Logical functions [IF, AND].

• <u>Data</u>

Create a Worksheet and Insert the various records to the cells.

• <u>Formatting</u>

Set the Font using Font Name, Font Size and with various Alignment tools.

• <u>Formulas and Functions</u>

Use some functions like Sum, Average, Count, Min, Max and Logical Functions. [IF, AND]

EXERCISE 6 (SPREADSHEET)

Create a worksheet for the given data and analyze the data with various filters and conditional formatting.

- <u>Data</u>
- <u>Formatting</u>
- Text: Font Face Font Size Font Color Alignment
- <u>Functions</u>
- <u>Conditional Formatting</u>
- <u>Filters</u>

EXERCISE 7 (PRESENTATION)

Create a presentation of minimum 10 slides from engineering related topics.

Design & Layout

Add a suitable Theme and Layout according to the content of all 10 slides.

Header & Footer

Header: Insert the Title & Author

Footer: Insert the Date & Slide Number

• Font & Paragraph

Font Face - Font Size Font Color - Alignment - Bullets & Numberings

• <u>Insert</u>

Images & Tables

EXERCISE 8 (PRESENTATION)

Create a presentation of 10 slides about your college with Slide & Custom Animation, Shapes Header & Footer, Slide number, Video, Audio, Picture, Tables and Hyperlink between slides.

• <u>Design & Layout</u>

Add a suitable Theme and Layout according to the content of all 10 slides.

Header & Footer

Header: Insert the Title & Author

Footer: Insert the Date & Slide Number

• <u>Font & Paragraph</u>

Font Face - Font Size - Font Color - Alignment - Bullets & Numberings

• <u>Insert</u>

Video / Audio / Tables / Shapes

• <u>Hyperlink</u>

Use hyperlink to link between slides.

<u>Animation</u>

Custom Animation for individual Objects / Slide Transition to all slides Custom Animation for individual Objects / Slide Transition to all slides

40002 Computer Application Practical BOARD PRACTICAL EXAMINATIONS

Note:

1. The student should be given proper training in all the exercises. All the exercises should be completed before the examinations.

2. The student should maintain an observation notebook / manual and record notebook. The record note book should be submitted during the Board Practical Examinations. Common printout for the record note book should not be allowed. Individual student output for every exercise should be kept in the record note book.

3. All exercises should be given in the question paper and students are allowed to select any one by lot. All exercises with the hard copy of the template related to the exercise should be provided by the external examiner for the examination. Templates can be varied for every batch.

4. The external examiner should verify the availability of the infrastructure for the batch strength before the commencement of Practical Examination.

	Description	Marks
А	Aim & Procedure	20
В	Execution *	50
С	Output Print Out / Handout ^	20
D	Viva voce	10
	100	

DETAILED MARK ALLOCATION

* Should be evaluated during the execution by the examiners only.

^ Students output should be printed and submitted with the

Hardware and Software Requirements

Minimum Hardware Requirements:

Desktop Computers – 30Nos Processor: 1 GHz, RAM: 1 GB, Hard Drive: 500 GB, Monitor: 15", Keyboard & Mouse, other accessories Overhead Projector: 1 No. Laser Printer: 1 No. **Minimum Software Requirements:** Operating System: Any GUI Operating System Office Package (Open Office Packages) Course Name Subject Code Semester Subject Title

: All branches of Diploma in Engineering and Technology

: 40006

: I and II

: ENGINEERING PHYSICS PRACTICAL TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
Subject	Hours	Houng /	Marks			
Subject	/ Wook	Somester	Internal	Board	Total	Duration
	/ WUUK	Semester	Assessment	Examinations	Ittal	Duration
<u>SEMESTER- I</u>						
ENGINEERING PHYSICS I	2	32				
PRACTICAL			60	100*	100	2 11.00
SEMESTER- II			00	100**	100	5 HIS.
ENGINEERING PHYSICS	2	32				
II PRACTICAL						

* Examinations will be conducted for 100 marks will be reduced to 40 marks **RATIONALE:**

In Diploma level engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

All the first eight experiments should be completed in the First Semester and the remaining eight • experiments should be completed in the Second Semester. All the experiments should be given for the practical examination at the end of the Year. 87

In order to develop best skills in handling Instruments / Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.

The external examiners are requested to ensure that a single experimental question should not be given to more than two students while admitting a batch of 30 students during Board Examinations.

SEMESTER - I

ENGINEERING PHYSICS - I PRACTICAL LIST OF EXPERIMENTS WITH OBJECTIVES:

1. MICROMETER (SCREW GAUGE).

To measure the thickness of the given irregular glass plate using a micrometer. To determine the area of the glass plate using a graph sheet and to calculate the volume of the glass plate.

2. VERNIER CALIPERS.

To measure the length and diameter of the given solid cylinder using Vernier calipers and to calculate the volume of the solid cylinder.

3. **PARALLELOGRAM LAW.**

To verify the parallelogram law using concurrent force.

4. LAMI'S THEOREM

To verify Lami's theorem using concurrent forces.

5. COMPARISON OF VISCOSITIES

To compare the co-efficient of viscosities of two low viscous Liquids by capillary flow method.

6. **STOKES' METHOD.**

To determine the coefficient of viscosity of a highly viscous liquid.

7. SONOMETER.

To determine the frequency of the given tuning fork.

8. **DEFLECTION MAGNETOMETER**

To compare the magnetic moments of the two bar magnets using Deflection Magnetometer in Tan A position, by equal distance method

SEMESTER - II ENGINEERING PHYSICS - II PRACTICAL LIST OF EXPERIMENTS WITH OBJECTIVES:

9. **REFRACTIVE INDEX**

To determine the refractive index of a transparent liquid (water) using a travelling Microscope.

10. SPECTROMETER.

To measure the angle of the prism using Spectrometer.

11. SOLAR CELL.

To draw the V - I characteristics of the solar cell.

12. LAWS OF RESISTANCES.

To verify the laws of resistances by connecting the two given standard resistances in series and parallel, using Ohm's law.

13. JOULE'S CALORIMETER.

To determine the specific heat capacity of water.

14. **COPPER VOLTAMETER.**

To determine the electro chemical equivalent (e.c.e.) of copper.

15. **P-N JUNCTION DIODE**.

To draw the voltage – current characteristics in forward bias and to find the 'dynamic Forward resistance' & 'knee voltage' from the graph.

16. LOGIC GATES.

To find the output conditions for different combinations of the input for NOT gate and 2 inputs AND, OR, NAND & NOR logic gates, using IC chips. (IC 7404 – NOT Gate, IC 7408 – AND Gate, IC 7432 – OR gate, IC 7400 – NAND Gate, IC 7402 – NOR Gate).

BOARD PRACTICAL EXAMINATIONS

Note:

• The students should be given proper practice in all the experiments. All the experiments should be completed before the examinations.

• The students should maintain an observation notebook / manual and record notebook. In the observation, the student should draw a diagram, mention the readings / observations, calculations and result manually. The same has to be evaluated for the observation mark.

• The record note book should be submitted during the Board Practical Examinations. The record work for the experiments should be completed and evaluated in the respective semesters.

• All experiments should be given and the students are allowed to select any one by lot.

• The external examiner should verify the availability of the infrastructure for the batch strength before the commencement of Practical Examination.

• The examiners should ensure the proper safety measures before the commencement of practical examinations.

	Marks	
А	Formula & Diagram	20
В	Tabulation with proper units	10
С	Observation (including taking readings)	40
D	Calculation	15
Е	Result	10
F	Viva voce	5
	Total	100

DETAILED MARK ALLOCATION

LIST OF EQUIPMENTS Minimum Two set of equipment / components are required For the Batch of 30 Students.

1. MICROMETER (SCREW GAUGE).

Screw gauge, graph sheet and irregular glass plate.

2. VERNIER CALIPERS.

Vernier Calipers and Solid Cylinder

3. PARALLELOGRAM LAW.

Vertical drawing board, two Z pulleys, three sets of slotted weights (5 x 50g) and twine thread.

4. LAMI'S THEOREM

Vertical drawing board, two Z pulleys, three sets of slotted weights (5 x 50g) and twine thread.

5. COMPARISON OF VISCOSITIES

Burette stand, graduated burette without stopper, rubber tube, capillary Tube, beaker, digital stopwatch, two liquids and funnel.

6. STOKES' METHOD.

Stokes' Apparatus, highly viscous liquid (Castrol oil), glass beads of different radii, digital stop watch and screw gauge.

7. SONOMETER.

Sonometer, screw gauge, tuning fork, rubber hammer, slotted weight hanger set (5 x 0.5kg) and paper rider.

8. DEFLECTION MAGNETOMETER

Deflection Magnetometer, meter scale and two bar magnets.

9. **REFRACTIVE INDEX**

Traveling Microscope, Beaker with transparent liquid and Saw dust.

10. SPECTROMETER.

Spectrometer, Sodium vapour lamp, Reading lens and Glass prism

11. SOLAR CELL.

Solar cell Kit for drawing the V - I characteristics

12. LAWS OF RESISTANCES.

Battery Eliminator, key, rheostat, ammeter, voltmeter, Connecting wires and two known standard resistances.

13. JOULE'S CALORIMETER.

Joule's Calorimeter, Battery eliminator, Rheostat, Key, Ammeter, voltmeter, stop clock, thermometer, digital Balance and connecting wires.

14. COPPER VOLTAMETER.

Copper Voltameter, Battery eliminator, Rheostat, Key, Ammeter, stop clock, digital balance, emery sheet and Connecting wires.

15. P-N JUNCTION DIODE.

P-N Junction Diode forward characteristics kit.

16. LOGIC GATES.

Logic gates testing apparatus kit with bread board for Mounting ICs and Integrated circuit chips (IC 7404 – NOT Gate, IC 7408 – AND Gate, IC 7432 – OR gate, IC 7400 – NAND Gate, IC 7402 – NOR Gate)

Course Name : All branches of Diploma in Engineering and Technology

Subject Code : 40007

Semester : I and II

Subject Title : ENGINEERING CHEMISTRY PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instr	ructions	Examination					
Subject	Hound Hound		Marks					
Subject	Week	Semester	Internal	Board	Total	Duration		
			Assessment	Examinations				
<u>SEMESTER I</u>								
ENGINEERING	2	22						
CHEMISTRY I	2	32						
PRACTICAL			60	100*	100	2 Цно		
SEMESTER II			00	100.	100	5 118.		
ENGINEERING	2	32	32	32				
CHEMISTRY II	2				32			
PRACTICAL								

*Examinations will be conducted for 100 marks and will be reduced to 40 marks.

OBJECTIVES:

1. At the end of the program the student will have knowledge about volumetric analysis in acidimetric, alkalimetric and permanganometric titration and their applications.

2. To get knowledge of estimation of total hardness, temporary and permanent hardness in the hard water sample.

3. To get knowledge about measurement of TDS, pH and to calculate Hydrogen ion concentration in a solution.

4. To get knowledge of estimation of dissolved chlorine in a water sample.

SEMESTER- I ENGINEERING CHEMISTRY – I PRACTICAL

Intellectual Skills

- 1. Carrying out Volumetric titrations and calculation of masses
- 2. Knowing units for Concentrations of solutions

Motor Skills

- 1. Measure quantities accurately
- 2. Observe chemical reactions
- 3. Handle the apparatus carefully

EXPERIMENTS

i) Acidimetry and Alkalimetry

1. Estimate the amount of sulphuric acid present in ml of a given solution using Standard solution of HCl of strength......N and an approximately decinormal solution of NaOH.

2. Estimate the amount of NaOH present inml the given solution using a standard solution of KOH of strengthN and approximately decinormal solution of H2SO4

3. Compare of strength of two given hydrochloric acids and estimate the stronger/weaker solution present inml using a standard solution of sodium hydroxide of strengthN

ii) Permanganometry

4. Estimation of the amount of Mohr salt present in......ml of the given solution using a standard solution of ferrous sulphate of strengthN and an approximately decinormal solution of KMnO4.

5. Estimation of the amount of Fe 2+ present in......nl of the given solution using a standard solution of ferrous ammonium sulphate of strengthN and an approximately decinormal solution of KMnO4.

6. Compare of strength of two given KMnO4 solution and estimate the stronger/weaker solution present inml using a standard solution of ferrous ammonium sulphate of strengthN

iii) Water Analysis

7. Water analysis for residual chlorine

- 8. Estimation of total hardness of a sample using EDTA
- 9. Water quality testing, pH (3 sample)

10. Water quality testing TDS (3 sample) Determination of pH and TDS using a pH meter and TDS meter respectively and calculation of hydrogen ion Concentrations (For three given samples, one of the samples brought from home by each student) (**This question must be given to any two students per batch in the Board Examination**).

SEMESTER- II ENGINEERING CHEMISTRY–II PRACTICAL

Intellectual Skills

1. Studying the effect of heating on substances and reagents

2. Study of the reactions of the following radicals leading to qualitative analysis of the given Inorganic simple salt soluble in water or dilute acids

3. Studying the harmful effects of effluents

Acid Radicals	: Carbonate, Chloride, Nitrate and Sulphate
Basic Radicals	: Lead, Copper, Aluminium, ferrous iron, Zinc, Barium
	Calcium, Magnesium and Ammonium

Motor Skills

1. Handling the apparatus carefully

2. Awareness on Industrial safety

EXPERIMENTS

I. Analysis of Inorganic simple salt (QUALITATIVE ANALYSIS)

• Analysis of nine inorganic simple salts containing any one acid radical and basic radical without omitting any of the above – mentioned radicals.

II. Analysis of Effluent containing Lead, Copper and Zinc metal ions (EFFLUENT ANALYSIS)

• Analysis of three effluents, each containing the above – mentioned metal ions.

• Report on the metallic pollutant with procedure (Basic Radical Analysis Procedure) and their harmful effects.

BOARD PRACTICAL EXAMINATIONS

Note:

• The students should be given proper practice in all the experiments. All the experiments should be completed before the examinations.

• The students should maintain an observation notebook / manual and record notebook. In the observation, the student should draw a diagram, mention the readings / observations, calculations and result manually. The same has to be evaluated for the observation mark.

• The record note book should be submitted during the Board Practical Examinations. The record work for the experiments in the concerned semester should be completed and evaluated in the respective semesters. Both Volumetric and Salt analysis shall be recorded in the same record note book. During the completion of the First semester, Volumetric analysis needs to be completed and records need to be submitted. The second semester, Salt analysis also be recorded in the same record note book.

• All experiments should be given as per the model question paper and the students are allowed to select any one by lot.

• The external examiner should verify the availability of the infrastructure for the batch strength before the commencement of Practical Examination.

• The examiners should ensure the proper safety measures as per the guidelines before the commencement of practical examinations.

DETAILED MARK ALLOCATION

	DESCRIPTION	MARKS
Α	PART A Engineering Chemistry I Practical	53
В	PART B Engineering Chemistry II Practical	42
С	VIVA VOCE	05
	Total	100

Guidelines for Evaluation

Part - A: ENGINEERING CHEMISTRY I PRACTICAL Volumetric Analysis - Distribution of Marks

FOR	MARKS
Short procedure	5
Titration I	18
Titration II	18
Calculations (3 X 4)	12
Total	53
Volumetric	Analysis
Titration value accuracy	for Titration I and II
Accuracy	Marks
±0.2ml	18
above ± 0.2 ml to ± 0.4 ml	15
above ± 0.4 ml to ± 0.6 ml	12
above ±0.6 ml 5	5

Determination of pH: Distribution of marks

FOR	MARKS
Answer for short questions on pH and T	TDS 5
Determination of pH of three samples (3	3 x 7) 21
Calculation of $H+(3X2) 6$	6
Determination of TDS - three samples (3X7) 21
TOTAL	53
Accuracy per	pH value
Accuracy	MARKS
±0.2ml	7
above ± 0.2 ml to ± 0.4 ml	5
above ±0.4 ml	2
TDS Value A	Accuracy
Accuracy	Marks
±0.2ml	7
above ± 0.2 ml to ± 0.4 ml	5
above ± 0.4 ml	2

Note: All the students should be given the same question and each batch of students is given different inorganic simple salt and effluent. (Nine salt and three effluents)

Part - B: ENGINEERING CHEMISTRY II PRACTICAL

Qualitative Analysis

FOR	MARKS
Identification Procedure of Acid Radical with Systematic Procedure	21
Identification Procedure of Basic Radical with Systematic Procedure	21
Total	42
Without Systematic Procedure	
Identification of Acid Radical with confirmatory test only	13
Identification of Basic Radical with confirmatory test only	13
Mere Spotting of Acid Radical and Basic Radical (3+3)	6

EFFLUENT ANALYSIS (two samples to be given)

FOR	MARKS
Identification of metallic pollutant procedure with systematic procedure Effluent sample	16
Harmful effects of metallic pollutant	5
Identification of metallic pollutant procedure with systematic procedure Effluent sample II	16
Harmful effects of metallic pollutant	5
Total	42
Without systematic procedure	
Group Identification Tests of metallic pollutant	13
Confirmatory Test of metallic pollutant	13
Mere Spotting of the pollutant (3+3)	6

SAFETY MEASURES (DO'S & DON'TS)

Experiments should be carried out with the supervision of Lab instructor / staff i/c.

- Do not enter into the Laboratory without proper supervision.
- Do wear protective equipment for eye protection and make sure to wear a laboratory coat.
- Do not smell, inhale the taste of chemicals.
- Do label all containers with chemicals.
- Do avoid direct contact with chemicals, far from your hands, face, clothes and shoes.
- Do not use Hazardous chemicals without proper directions.
- Do Use separate cabinets for acid solutions with concentration more than 6M.

• Whenever, accidentally when concentrated acids fall on hands / cloth, wash thoroughly with running water, and after taking first aid, the student may be taken to hospital.

• Do attach chemical labels with all necessary information to all containers.

• Do read the warning labels when opening newly received reagent chemicals. This will help to be aware of any special storage precautions such as refrigeration or inert atmosphere storage.

• Do periodic check on chemical containers for rust, corrosion and leakage.

• Do not Store Chemicals in bottles in air bags especially those hazardous and moisture absorbing chemicals.

• Do not use mouth suction to fill a pipette. Use a pipette bulb or other filling devices.

• Do not Smoke, drink, eat and the application of cosmetics is forbidden in areas where hazardous chemicals are used or stored.

- Do use chemicals with adequate ventilation.
- Do wash thoroughly with soap and water whenever you leave the lab after handling any chemicals.
- Do Keep your hands and face clean free from any trace of chemicals.
- Do not play with chemicals.

List of Apparatus to be provided for each student in Chemistry Laboratory during the Engineering Chemistry –I&II Practical Classes / Board Examination in addition to the required reagents:

LIST OF EQUIPMENTS List of Equipment Required for a Batch of 30 Students

NON-CONSUMABLE ITEMS

Sl. No.	Name of the item	Quantity
1	LPG Connection	Sufficient Nos.
2	Exhaust Fan (High Capacity)	Sufficient Nos.
3	Fire Extinguisher	1
4	First Aid Box (Full Set)	2
5	Safety Chart	1
6	Chemical Balance	1
7	Fractional Weight Box	1
8	pH Meter	2
9	TDS meter	2
1	Working Table with all accessories	8

GLASSWARE AND OTHER ITEMS

Sl. No.	Name of the item	Quantity
1	Burette(50 ml)	35
2	Burette stand	35
3	Pipette(20 ml) (With safety bulb)	35
4	Pipette(10 ml)	35
5	Conical Flask(250 ml)	35
6	Funnel (3")	50
7	Porcelain Tile	35
8	Measuring Cylinder (10 ml)	5
9	Measuring Cylinder (1000 ml)	2
10	Reagent Bottle (White) (250 ml)	60
11	Reagent Bottle (White) (125 ml)	100
12	Reagent Bottle (Amber) (250 ml)	80
13	Test Tube(15 mm x 1.5 mm)	1000
14	Test Tube(15 mm x 2.5 mm)	500
15	Test Tube Stand	35
16	Test Tube Holder	35
17	Test Tube Cleaning Brush	35
18	Glass Trough	5
19	Beaker(100 ml)	35
20	Glass Rod(15 cm)	35
21	Watch Glass (3")	35
22	Wash Bottle (Polythene)	35
23	Nickel Spatula	35
24	Bunsen Burner for Gas connection	35
25	Plastic Bucket(15L)	10
26	Filter Papers (Round)	Sufficient No.
27	Pipette bulb / filling devices	35

SEMESTER - II

Course Name :	All branches of Diploma in Engineering and Technology	
Subject Code	: 40021	
Semester	: II	
Subject Title	: COMMUNICATIVE ENGLISH – II	

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
Subject				Marks		
Bubject	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	Duration
COMMUNICATIVE ENGLISH – II	4	64	25	100*	100	3 Hrs.

Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

Unit	Topics	Time
		(Hrs.)
Ι	Functional Grammar and Usage	13
II	English for Enrichment	11
III	Situational English	11
IV	Creative English	11
V	English for Scholarly Presentation/ Fluency	11
	Test & Model Exam	7
	Total	64

<u>40021 COMMUNICATIVE ENGLISH – II</u> DETAILED SYLLABUS

Contents: Theory

*

Unit	Name of the Topics	Hours
I	Functional Grammar and Usage Application of Modal Verbs Negative Formation (No, Never, Nothing, Hardly, Seldom, No longer, None, Nowhere, Neither nor) Use of Subordinating Conjunctions Use of Conditionals Reported Speech (Dialogue to Indirect Speech) Punctuation	13
П	English for Enrichment The Language Game: Unscramble Phrases (Noun Phrase, Verb Phrase, Prepositional Phrase, etc.) Cause and Effect Writing Suitable Responses to the Given Questions Giving Instructions	11

	Situational English	
	Email for Official Communication	
TTT	Social Media Language	11
111	Reacting to Situations	11
	Correction of Sentences	
	Proverbs for Everyday Situations	
	Creative English	
	The Language Game: Word Puzzle Grid	
117	Notice Writing for the Given Situations	11
1 V	Slogan Writing	11
	Technical Words	
	Infographics Comprehension	
	English for Scholarly Presentation/ Fluency	
V	"The Lost Child" by Mulk Raj Anand	
	"My Vision for India" by Abdul Kalam	11
	"From Lover's Gift" by Rabindranath Tagore	
	"The Flower" by Tennyson	

Reference Books:

Glossaries

- https://www.engineering-dictionary.com/
- https://techterms.com/definition/
- http://dictionary.tamilcube.com/
- https://www.lexilogos.com/english/tamil_dictionary.htm

Grammar

- Just Enough English Grammar Illustrated, Gabriele Stobbe, McGraw-Hill Osborne Media, 2008
- Visual Guide to Grammar and Punctuation, DK Publishing, 2017
- English Grammar in Use, Raymond Murphy, Cambridge University Press, 2019
- Intermediate English Grammar, Raymond Murphy, Cambridge University Press Second Edition.
- Essential English Grammar, Raymond Murphy, Cambridge University Press, New edition.

Motivation

- An Autobiography; Or, The Story of My Experiments with Truth, Mahatma Gandhi, Penguin Books, 2001
- You Can Win, Shiv Khera, New Dawn Press, 2004
- Chicken Soup for the Soul, Jack Canfield, Mark Victor Hansen, 2001

Course Name : All branches of Diploma in Engineering and Technology

Subject Code : 40022

Semester

Subject Title : ENGINEERING MATHEMATICS II

: II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
Subject	ct Hours Hours / / Week Semester		Marks			
Subject			Internal Assessment	Board Examinations	Total	Duration
ENGINEERING MATHEMATICS II	5	80	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and will be reduced to 75 marks.

Unit	Topics	Time (Hrs.)
Ι	Analytical Geometry	16
II	Vector Algebra	16
III	Integral Calculus - I	16
IV	Integral Calculus - II	16
V	Application of Integration	16
	Total	80

TOPICS AND ALLOCATION OF HOURS:

<u>40022 ENGINEERING MATHEMATICS – II</u> DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
Ι	ANALYTICAL GEOMETRY 1.1 ANALYTICAL GEOMETRY II: Circles – General equation of a circle Family of circles-Concentric circles – Orthogonal circles (condition only) – contact of circles - simple problems. 1.2 CONICS Definition of a conic, Focus, Directrix and Eccentricity. General equation of a conic. $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ (Statement only). Condition for conic (i) for circle: $a = b$ and $h = 0$ (ii) for pair of straight line: $\begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0 \begin{vmatrix} a & h & g \\ h & b & f \\ g & f & c \end{vmatrix} = 0$ (iii) for parabola: $h^2 - ab = 0$ (iv) for ellipse: $h^2 - ab < 0$ and (v) for hyperbola: $h^2 - ab > 0$ Simple problems.	16
п	 VECTOR ALGEBRA – I 2.1 VECTOR – INTRODUCTION Definition of vector – types, addition, subtraction and scalar multiplication of vector, properties of addition and subtraction. Position vector. Resolution of vector in three dimensions, distance between two points, Direction cosines and direction ratios. Simple problems. 2.2 PRODUCT OF TWO VECTORS 	16

	Scalar product – Vector product – condition for parallel and perpendicular vectors,	
	properties, angle between two vectors, unit vector perpendicular to two vectors –	
	simple problems. Application of Scalar and Vector product.	
	INTEGRAL CALCULUS – I	
	3.1 INTEGRATION - DECOMPOSITION METHOD	
	Historical approach for integration - Anti derivative - Definition of the	
	integral as an anti-derivative - Fundamental rules for integration -	
	Integration using decomposition method - simple problems based on	
	Engineering Applications.	
	3.2 METHODS OF INTEGRATION - INTEGRATION BY	
TTT	SUBSTITUTION	
111	Integrals of the form $\int [F(x)]^n f'(x) dx \int [F(x)]^n f'(x) dx$ where $n \neq -1n \neq -1$,	16
	$\int \frac{f'(x)}{f(x)} dx \int \frac{f'(x)}{f(x)} dx$ and	
	$\int F[f(x)]f'(x)dx \int F[f(x)]f'(x)dx \text{simple problems.}$	
	3.3 STANDARD INTEGRALS	
	Integrals of the form $\int \frac{dx}{a^2 \pm x^2}$, $\int \frac{dx}{x^2 - a^2}$, $\int \frac{dx}{\sqrt{a^2 - x^2}} \int \frac{dx}{a^2 \pm x^2}$, $\int \frac{dx}{x^2 - a^2}$, $\int \frac{dx}{\sqrt{a^2 - x^2}}$,	
	$\int \sqrt{a^2 - x^2} dx$, $\int \sqrt{x^2 \pm a^2 dx} \int \sqrt{a^2 - x^2} dx$, $\int \sqrt{x^2 \pm a^2 dx}$ - Simple problems.	
	INTEGRAL CALCULUS – II	
	4.1 METHODS OF INTEGRATION - INTEGRATION BY PARTS	
	Integrals of the form $]x \sin nxdx$, $]x \cos nxdx$, $]xe^{nx}dx$, $]x^n \log xdx$,	
	and J log $x dx$,- Simple problems.	
	4.2 BERNOULLI'S FORMULA	
IV	Evaluation for the integrals	16
	$\int \max \sin nx dx$, $\int x^m \cosh dx and \int \operatorname{cm} x dx$ Where $m \leq 3$ using	
	Bernoulli's formula - Simple problems.	
	A 3 DEFINITE INTECRALS	
	Definition of definite integral – Properties of definite integrals -	
	Simple problems	
	APPLICATION OF INTEGRATION	
	5.1 AREA AND VOLUME	
	Area and volume – Area of Circle – volume of Sphere and Cone - Simple problems	
V	5.2 FIRST ORDER DIFFERENTIAL EQUATION	16
	Solution of first order variable type differential euquation – Simple problems.	
	5.3 LINEAR TYPE DIFFERENTIAL EQUATION	
	Solution of Linear differential equation –simple problems.	
Refere	nce Books:	
1	Engineering Mathematics V. Sundaram, R. Balasubramanian	

2 Engineering Mathematics – I C.B.Gupta, A.K.Malik, New age international Publishers, 1st edition – 2008.

3 Differential Calculus S. Balachandra Rao, CK Shantha New age Publishers Probability Theory and Stochastic Process B.Prabhakara Rao, TSR Murthy, BS Publishers.

4 Vectors and Geometry GS.Pandey, RR.Sharma, New age international publishers.

5 Engineering Mathematics – I Guruprasad Samanta, New age international publishers, 2nd edition 2015. Engineering Mathematics Reena Garg, Khanna publishing House, New Delhi, Revised edn. – 2018.

Engineering Mathematics Reena Garg, Khanna publishing House, New Denn, Revised edit. – 2018
 Engineering Mathematics Volume I P. Kandasamy K. Thilagavathy, S. Chand & Company Ltd.

An additional hour may be taken from 'Physical Education'. The hour already allotted for Physical Education is two. Now it has been reduced to an hour.

Board Examination-Question Paper Pattern For all theory subjects except Communicative English I & II and Engineering Graphics I & II.

Note:Clarkes Table and Programmable Calculators are not permitted.Relevant data should be provided in the question paper for solving the problems if any are required.Time: 3 Hrs.Max.Marks:100

PART – A Five questions will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART-B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked as either / or type. One question from every unit.

Answer either A or B. Each question carries 15 marks.

A and B have subdivisions. (7 + 8)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weightage.

PART A	
Definitions and Statements.	$5 \ge 1 = 5 $ Marks
Question Number 1 to 5	
PART B	
Short answer type questions	5 X 2= 20 Marks
Question Number 6 to 20	
PART C	
Descriptive answer type questions	5 V 15 - 75 Marks
(Either A or B)	$J \mathbf{A} \mathbf{I} \mathbf{J} = \mathbf{I} \mathbf{J}$ Wiarks
Question number 21 to 25	
TOTAL	100 Marks *

Note: Board Examinations will be conducted for 100 Marks and converted to 60 Marks.

Course Name : All branches of Diploma in Engineering and Technology

Subject Code : 40023

Semester : II

Subject Title : ENGINEERING PHYSICS II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instru	ictions		Examina	ation	
Subject	Hours /	Hours /	Marks			
Subject	Week	Semester	Internal Assessment	Board Examinations	Total	Duration
ENGINEERING PHYSICS II	4	64	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks will be reduced to 75 marks

Topics and Allocation of Hours:

Unit	Topics	Time (Hrs.)
Ι	HEAT	14
II	THERMODYNAMICS, LIQUEFACTION OF GASES & NON- CONVENTIONAL ENERGY	14
III	LIGHT AND REMOTE SENSING	12
IV	ELECTRICITY	12
V	ELECTRONICS	12
	Total	64

<u>40023 ENGINEERING PHYSICS – II</u> DETAILED SYLLABUS

Conten	ts: Theory	
Unit	Name of the Topics	Hours
Ι	 HEAT TRANSFER OF HEAT Concept of Heat and Temperature – Centigrade, Fahrenheit and Kelvin scales of temperature measurement- Conduction, convection and radiation – Definitions and explanations-Good and Poor conductors-Examples. Coefficient of thermal conductivity-Definition and SI Unit-Properties of thermal radiation – Heat conversions. KINETIC THEORY OF GASES Postulates – Mean square velocity and Root Mean Square (RMS) velocity of molecules – Definitions and expressions – Expression for the pressure of a gas on the basis of postulates of kinetic theory of gases – Relation between pressure and kinetic energy of the gas-Relation between kinetic energy and absolute temperature–Simple problems based on the expression for the pressure of a gas. SPECIFIC HEAT CAPACITY Specific heat capacity of a substance (solids and liquids) –Definition – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant volume – Specific heat capacity of a gas at constant volume – 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 Cp is greater than Cv– Derivation of Mayer's relation – calculation of Universal gas constant R from the gas equation PV= RT. Simple problems based on Mayer's relation – Solved problems. 	14

П	 THERMODYNAMICS, LIQUEFACTION OF GASES and NON-CONVENTIONAL ENERGY 2.1 THERMODYNAMICS First law of thermodynamics – Statement – Isothermal and Adiabatic changes – Explanation – Equations for isothermal and adiabatic changes (No derivation) Simple problems based on equations P1V1 = P2V2 and P1V1 © = P2V2 © . Second law of thermodynamics – Clausius statement and Kelvin's statement – Working of Carnot's reversible engine with indicator diagram and its efficiency – Applications of heat and thermodynamics. 2.2 LIQUEFACTION OF GASES Critical temperature, critical pressure and critical volume – Definitions – Principle used in cascade process –Cascade process of liquefaction of oxygen –Disadvantages of cascade process. 2.3 NON – CONVENTIONAL ENERGY Introduction – Non-renewable and Renewable (Alternate) energy sources – Examples – Solar energy, wind energy, – Advantages and disadvantages of renewable energy – Tidal Energy. 	14
III	LIGHT AND REMOTE SENSING OPTICS Refraction – Laws of refraction – Refractive index of a medium – Derivation of refractive index of glass prism using minimum deviation – Definition – Spectrometer – Experimental determination of refractive index using spectrometer- Phenomenon of total internal reflection – Fiber optics – Introduction –Optical Fiber Cable as a wave guide – advantages of OFC – problems using the refractive index – Applications of total internal reflection. LASER LASER – Characteristics of LASER – principle of LASER –Spontaneous emission – Stimulated emission – population inversion – Ruby Laser Construction and working- Uses of LASER. REMOTE SENSING Remote sensing – Introduction – Active and passive remote sensing – Explanation and examples – Components of remote sensing – Data acquisition and data analysis – Reference data – RADAR – principle and working with block diagram.	12
1V	 ELECRICITY ELECTRICAL CIRCUITS Ohm's law – Laws of resistances – Resistivity, Conductivity, Superconductivity and Meissner effect- Definitions – Kirchhoff's current and voltage laws. Condition for balancing the Wheat Stone's bridge – Simple problems based on expression for resistivity. 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 connections of capacitors – Applications of capacitors. EFFECTS OF CURRENT Joule's law of heating – Experimental determination of specific heat capacity of a liquid using Joule's calorimeter – Faraday's laws on electrolysis – Electro chemical equivalent (e.c.e) of an element – Definition – Experimental determination of e.c.e. of copper – Simple problems based on expressions for e.c.e – Applications of heating effect of electric current. MEASURING INSTRUMENTS Expression for the force acting on a current carrying straight conductor placed in a uniform magnetic field – 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 	12

	galvanometer into an Ammeter and Voltmeter. Simple problems based on conversion of Galvanometer into Ammeter and Voltmeter – Solved problems.	
V	 ELECTRONICS 5.1 SEMI CONDUCTORS Semiconductors – Intrinsic semiconductors -Concept of holes – Doping – Extrinsic semiconductors – Energy bands in solids – Energy band diagram of good conductors, insulators and semiconductors – Concepts of Fermi level – P type and N type semiconductors. 5.2 DIODES AND TRANSISTORS P-N junction diode – Forward bias and reverse bias –Rectification action of diode – Working of full wave bridge rectifier using P N junction diodes – PNP and NPN transistors – Three different configurations – Working of NPN and PNP transistor in common base configuration. 5.3 DIGITAL ELECTRONICS Digital electronics – Introduction – Logic levels – Basic logic gates: OR, 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 IC's – Applications of transistors, gates and IC's – Solved problems. 	12

Reference Books:1.Fundamentals of physics – Brijlal and Subramaniam.

Fundamentals of Electricity – D.N. Vasudeva – S. Chand & co 2.

Non- Conventional energy sources – G.D. Rai.- Khanna publishers 3.

Text book of Remote sensing and Geographical information systems – M. Anji Reddy BS 4. publications.

Course Name : All branches of Diploma in Engineering and Technology Subject Code : 40024 Semester : II

Subject Title : ENGINEERING CHEMISTRY II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instr	ructions]	Examination			
Subject	Hours/	Houns/	Marks			Duration	
Subject	Week Semeste	Semester	Internal Assessment	Board Examinations	Total	Duration	
ENGINEERING CHEMISTRY II	4	64	25	100*	100	3 Hrs.	

*Examinations will be conducted for 100 marks and will be reduced to 75 marks.

Topics and Allocation of Hours:

Units	Topics	Time
т	Electrochemistry – Electro Chemistry-I, Electro Chemistry-II –	14
L	Energy Sources.	17
П	Chemistry of corrosion and prevention - corrosion – theory of	14
11	Corrosion – Methods of Prevention of Corrosion, Organic Coatings	14
III	Energy Chemistry - Fuels, Combustion, Rocket Propellants.	12
117	Applied Chemistry – Technology of Water – I,– Technology of	10
1 V	Water – II	12
V	Environmental Chemistry – Air Pollution, Water Pollution, Solid	12
	Waste Management and Green Chemistry	12
	Total	64

RATIONALE:

• The subject Engineering Chemistry – II develop basic understanding about electrochemistry, energy resources, corrosion, methods of prevention of corrosion and its organic coatings.

• Energy chemistry explains various aspects with regard to fuels, combustion and rocket propellants.

• Prime importance is given to technology of water, its analysis of few parameters like pH, TDS, Hardness, dissolved chlorine, e-coli etc.

• Environmental chemistry explains environmental pollution, solid waste management and green chemistry.

OBJECTIVES:

The objective of this Course is to make the student:

- 1. To acquire knowledge about electro chemistry, electro chemical cell.
- 2. To know about corrosion and prevention.
- 3. To acquire knowledge about fuels, combustion of fuels and rocket propellants.
- 4. To know about water and its analysis.
- 5. To acquire knowledge about Environmental Chemistry.

40024 ENGINEERING CHEMISTRY I DETAILED SYLLABUS

Contents:	Theory	
Units	Name of the Topics	Hours
Ι	 ELECRO CHEMISTRY 1.1 Electrochemistry-I Electronic concept of oxidation and reduction – Faradays' laws of electrolysis – simple problems – electrolytes - nonelectrolytes – electrolysis – definition – Mechanism – Industrial applications of Electrolysis – electroplating – chrome plating. 1.2 Electrochemical cell Electrochemical cell – Definition Galvanic cell – Formation of Daniel cell – Electrochemical series – Definition – significance. 1.3 Energy Sources Primary Battery – Secondary Battery – Definition and example – cell – Construction, working principle and Uses of Lead acid – Storage battery – Lithium ion – battery - Solar Cell – Definition – working principle. 	14
П	 CHEMISTRY OF CORROSION AND PREVENTION 2.1 Corrosion Definition – types of corrosion – theories of corrosion – galvanic cell formation theory – differential aeration theory – factors influencing rate of corrosion. 2.2 Methods of Prevention of corrosion Galvanization – tinning – anodisation – cathodic protection – sacrificial anode method and impressed voltage method. 2.3 Organic Coatings Paint – definition – Components of paints – Varnish – definition – Preparation of oil varnish – differences between paint and varnish – Special Paints – Luminescent paint, fire retardant paint, Aluminum paint and distemper. 	14
III	 ENERGY CHEMISTRY 3.1 Fuels Fuel – Definition – Calorific value – calorie – Liquid fuels – liquid hydrogen – power alcohol – uses – Refining of Petroleum – Fractional distillation – Cracking (Concept only) – Gaseous fuels – Preparation, composition and specific uses of Producer gas and Water gas – Composition and uses of CNG and LPG – advantages of gaseous fuels. 3.2 Combustion Definition – Combustion calculation by mass (for solid and liquid fuels) – Stoichiometric calculations – Volume of air required – Definition of Flue gas – Flue gas Analysis – Orsat Apparatus – Simple numerical problems. 3.3 Rocket Propellants Definition – characteristics – Classification of propellants –brief idea of solid and liquid propellants. 	12
IV	APPLIED CHEMISTRY 4.1 Technology of Water–I Sources of water – depletion of underground water – Reasons – 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 – Disadvantages of hard water – Estimation of total hardness by EDTA method – Problems involving Total, Carbonate and Non– carbonate hardness in ppm – Disadvantages of using hard water in boilers –Scale formation, Corrosion of boiler metal, Caustic Embrittlement – Priming and Foaming. 4.2 Technology of Water–II Softening of hard water – Ion-Exchange method and Reverse Osmosis method – Municipal supply – purification of drinking water – Quality of potable water (WHO	12

	standard) – parameters of potable water – pH – TDS – residual Chlorine permissible limits – determination of ecoli (preliminary idea)	
V	 ENVIRONMENTAL CHEMISTRY 5.1 Air Pollution Pollution and Air pollution – Definition – Air pollutants (SO2, H2S, HF, CO and Dust) – Sources and Harmful effects – smog and types of smog – 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) – Harmful effects of Ozone Layer Depletion – Control of Air Pollution. 5.2 Water Pollution Causes of Water Pollution – Sewage, Effluents, Algae and Microorganisms – Harmful effects – Definition – Sewage – Disposal – Industrial Effluents – Harmful effects. 5.3 Solid Waste Management Solid Waste – Definition – Problems – Types of Solid Waste – Methods of Disposal – Land fill and Incineration – Recycling – Definition – Examples – Advantages of Recycling (Basic ideas) Green Chemistry Definition – Goals of Green Chemistry (Basic ideas) 	12

Reference Book:

- 1. Introduction to Engineering Chemistry, Shradha Sinha, S S Dara & Sudha Jain, S. Chand Publishers, 2004.
- 2. S.Chand's Engineering Chemistry, S S Dara, Sudha Jain & Shradha Sinha, 2005.
- 3. A Textbook of Engineering Chemistry, Dr. Uday Kumar, 2013.
- 4. Chemistry Higher Secondary 1st and 2nd year, Vol. I & II, Tamil Nadu Text Book Corporation, 2018.
- 5. Engineering Chemistry Fundamentals and Applications, Shikha Agarwal, Cambridge University Press, 2019.
- 6. Handbook of rain water harvesting, Chennai Metrowater, 2018
- 7. Engineering Chemistry, Jain&Jain Dhanpat Raj Publishing Company,2016
- 8. Pradeep's new course chemistry, Vol I, Class 11,Dr.S.C. Khetarpal, Dr.S.N.Dhawan, Pradeep Publication,2018
- 9. Electrochemistry and Corrosion Science,,Nestor Perez,

https://link.springer.com/book/10.1007%2F978-3-319-24847-9#

Board Examination-Question Paper Pattern For all theory subjects except Communicative English I & II and Engineering Graphics I & II.

Note: Clarkes Table and Programmable Calculators are not permitted.

Relevant data should be provided in the question paper for solving the problems if any are required. Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked either / or type. One question from every unit Answer either A or B. Each question carries 15 marks.

A and B have subdivisions. (7 + 8)

The questions are to be numbered from 1 to 25. All the units are to be covered with equal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions	10 X 2 = 20 Marks
Question Number 6 to 20	
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X15 = 75 Marks
Total	100 Marks*

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks.

Course Name : All branches of Diploma in Engineering and Technology

Subject Code : 40025

Semester : II

Subject Title : ENGINEERING GRAPHICS II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
G1	TT	Hours/ Semester	Marks			
Subject	Hours/ Week		Internal Assessment	Board Examinations	Total	Duration
ENGINEERING CHEMISTRY I	5	80	25	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and will be reduced to 75 marks.

Topics and Allocation of Hours:

Units	Topics	Time
Ι	Construction of Polygons and Projection of Planes	20
II	Projection of Solids and Section of Solids	20
III	Development of Surfaces	20
IV	Missing Views and Isometric Projections	20
	Total	80

RATIONALE:

Engineering graphics is a basic subject for all branches of diploma in engineering and technology. Since engineering drawing is considered as the language of engineers, the proper understanding and practice is required with the use of proper drawing instruments.

This subject is aimed at providing basic understanding of the fundamentals of engineering drawings, mainly visualization of three dimensional drawings for practical applications and the use of drawings in real life engineering applications.

The topics covered are based on the syllabus for diploma studies in engineering. The subject is planned to include sufficient practice which would help the students in visualization of three dimensional objects and developing the drawing.

The chapters are arranged in sequence and start from the construction of polygons, concepts of projection of planes, solids and sections of solids. It proceeds to the construction of development of surfaces and isometric projections.

By the end of the subject, it is expected that the students would be matured to visualize engineering components by reading an engineering drawing.

OBJECTIVES:

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

- Understand the importance of drawing
- Identify and use of the drawing instruments
- AAAA Acquire knowledge about the construction of polygons in various positions
- Understand the concepts of projection of planes
- Draw the projection of solids and section of solids
- \triangleright Draw the development of solids and sheet metal components
- Draw the missing views from the given drawing
- \triangleright Convert orthographic views into isometric drawings

Note: While practicing, usage of drawing instruments like drawing board, mini drafter, compass, divider, drawing clips / cello tape, H, 2H and HB grade drawing pencils, eraser etc., are mandatory for class work and examinations. Size of drawing sheet recommended: A2 size (420 x 594 mm). Use both sides of drawing sheets for practice.

40025 ENGINEERING GRAPHICS - II DETAILED SYLLABUS

Contents: Theory Unit Name of the Topics Hours **CONSTRUCTION OF POLYGONS AND PROJECTION OF PLANES 1.1 Construction of Polygons** Construction of regular polygon: triangle, square, pentagon and hexagon - various positions – side of the polygon is parallel, perpendicular and inclined to principal planes. Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises covering all methods 12 1 **1.2 Projection of Planes** 20 Projection of planes - rectangle, square, hexagon and circle-plane parallel to HP and perpendicular to VP – plane parallel to VP and perpendicular to HP – plane perpendicular to both HP and VP – plane parallel to both the planes – simple exercises. Minimum criteria for Class assessment No. of Exercises covering all methods No. of Drawing Sheets 16 2 PROJECTION OF SOLIDS AND SECTION OF SOLIDS 2.1 Projection of Solids – I Introduction – important terms – classification of solids – triangular and hexagonal prisms and pyramids – solids of revolution –cylinder and cone– projection of solids in simple positions – axis parallel to one plane and perpendicular to other plane. Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises covering all methods 1 8 2.2 PROJECTION AND SECTION OF SOLIDS 2.2.1 Projection of Solids - II Position of solid-axis inclined to one plane and parallel to other plane -axis parallel to both planes – simple exercises. 2 20 Minimum criteria for Class assessment No. of Exercises covering all methods No. of Drawing Sheets 1 6 2.2.2 Section of Solids Need for section view – cutting plane – cutting plane line–representation as per BIS code– Hatching line – true section-section of simple solids –triangular and hexagonal prisms and pyramids, cylinder, cone – position of solids – axis perpendicular to one plane and parallel to other plane – position of cutting planes – cutting plane perpendicular to one plane and parallel to another plane – cutting plane perpendicular to one plane and inclined to another plane – true shape– exercises. Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises covering all methods 2 8 **DEVELOPMENT OF SURFACES 3.1 Development of Regular Solids** Need for preparing development drawing with reference to sheet metal work - procedure for preparing development drawing of prism, pyramid, cylinder and cone –exercises in rectangular, square and hexagonal prisms and pyramids – exercises in regular cylinder and 3 20 cone. Minimum criteria for Class assessment No. of Drawing Sheets No. of Exercises covering all methods 8

	3.2 Development of Componen	ts			
	Cutting plane – cutting plane line – development of truncated prism and cylinder – frustum				
	of pyramid and cone – development of simple engineering components such as elbow,				
	ducts, lamp shade and funnel.				
	Minimum criteria for Class assessment				
	No. of Drawing Sheets	No. of Exercises covering all methods			
	3	10			
	MISSING VIEWS AND ISOM	IETRIC PROJECTIONS			
	4.1 Missing Views				
	Reading a drawing – missing vie	ws – visualization – possible view problems – Drawing a			
	missing view or third view (Drav	<i>w</i> missing view only) – simple exercises.			
	Minimum criteria for Class assessment				
	No. of Drawing Sheets No. of Exercises covering all methods				
	1	6			
4	4.2 Isometric Projections		20		
	Introduction-isometric view - i	sometric projection – methods of drawing an isometric			
	view – box method – construction of arcs and circles – four centre method for drawing				
	ellipse – construction of isometric drawing of components from the given orthographic				
	views – simple exercises.				
	Minimum criteria for Class assessment				
	No. of Drawing Sheets	No. of Exercises covering all methods			
	1	8			
Reference Books:					

1. Bhatt N.D, "Engineering Drawing", Charotar Publishing House Pvt. Ltd.

- 2. Gill P.S, "Engineering drawing", S.K.Kataria & Sons.
- 3. Gopalakrishna.K.R., "Engineering Drawing", (Vol 1 & 2 combined), Subhas Publications.
- 4. Venugopal.K, Prabhu Raja V, "Engineering Graphics", New Age International Publishers.
- 5. Natarajan K V "A TextBook of Engineering Drawing and Graphics" Publisher: N Dhanalakshmi.
- 6. Shah M B, Rana B C, "Engineering Drawing", Pearson.
- 7. Basant Agrawal, Agrawal C M "Engineering Drawing", McGraw hill HED.
- 8. Parkinson A C, "First Year Engineering Drawing", Sir Isaac Pitman & Sons Ltd.

9. Thomas E. French, Charles J. Vierck, "The Fundamentals of Engineering Drawing", McGraw Hill Book Co. Inc.

ENGINEERING GRAPHICS II PORTIONS FOR ASSESSMENT TEST

Assessment Test 1

Portion: Unit I and II

Question pattern

Duration: 2 Hrs.

Part - A

• Three questions will be asked.

- Answer any two questions.
- Each question carries five marks.
- Minimum one question should be asked from each unit first chapter.

(Chapter 1.1 and 2.1).

Part - B

- Three questions will be asked.
- Answer any two questions.
- Each question carries twenty marks.
- Minimum one question should be asked from each unit second chapter.

(Chapter 1.2 and 2.2).

Assessment Test 2

Portion: Unit III and IV

Question pattern

Duration: 2 Hrs.

Part – A

Part - B

- Three questions will be asked.
- Answer any two questions.
- Each question carries five marks.
- Minimum one question should be asked from each unit first chapter.

(Chapter 3.1 and 4.1).

(2 X 20 = 40)

(2 X 5 = 10)

- Three questions will be asked.
- Answer any two questions.
- Each question carries twenty marks.
- Minimum one question should be asked from each unit second chapter.

(Chapter 3.2 and 4.2).

Internal Assessment Marks:

Description	Marks
Class Assessment Sheets	10
(Minimum 10 Sheets)	10
Average of Two Assessment Tests	05
Model Examination	05
Attendance	05
Total	25

Max. Marks: 50

Max. Marks: 50

(2 X 5 = 10)

(2 X 20 = 40)

BOARD EXAMINATION QUESTION PAPER PATTERN

Time: 3 Hrs.

Max. Marks: 100

Note: 1. Answer all the questions only in the drawing sheet.

2. Assume missing dimensions suitably, if required.

3. Proper drawing instruments and board should be used

Part – A

(4x5 = 20)

Note: Five questions will be asked (Sl. No: 1 to 5). Answer any four questions. Each question carries five marks. Minimum one question should be asked from each unit in the first chapter. (Chapters: 1.1, 2.1, 3.1, 4.1)

Part – B

(4x20 = 80)

Note: Six questions will be asked (Sl. No: 6 to11). Answer any four questions. Each question carries twenty marks. Minimum one question should be asked from each unit second chapter. (Chapters: 1.2, 2.2, 3.2, 4.2) Course Name Subject Code Semester

Subject Title

All branches of Diploma in Engineering and Technology

: 40028

:

:

: II Semester

BASICS OF INDUSTRIES & WORKSHOP PRACTICAL TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

	Instructions		Examination			
Subject	Subject Hours /		Marks			
Week	Semester	Internal Assessment	Board Examinations	Total	Duration	
BASICS OF INDUSTRIES & WORKSHOP PRACTICAL	5	80	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks will be reduced to 75 marks Topics and Allocation of Hours:

Unit	Topics	Time (Hrs.)			
A: THEORY PORTION					
Ι	BASICS OF INDUSTRIES	6			
II	INDUSTRIAL SAFETY AND MAINTENANCE	6			
III	QUALITY AND STANDARDS	6			
IV	BASICS OF ENGINEERING	8			
V	INDUSTRY 4.0	6			
B: PRACTICAL PORTION					
	24				
	BASIC SERVICE AND MAINTENANCE PRACTICES	24			
	Total	80			

COURSE OBJECTIVE:

- To learn the basics of industries.
- To understand the MSME.
- To understand the importance of safety and plant maintenance.
- To learn the importance of the quality and its standards.
- To study the basics of engineering.
- To understand the industry 4.0.
- To understand the importance of global readiness in industries.
- To understand basic tools and measuring instruments in a general workshop.
- To understand and familiar with the shop floor practices and safety procedures.
- To understand the basic engineering manufacturing practices on the metal and wood works.
- To understand the basic service and maintenance practices in the wiring and basic plumbing

practices.

- To learn the importance and various methods of rainwater harvesting to improve the ground water level.
- To understand the principles of basic industrial and domestic applications.

BASICS OF INDUSTRIES DETAILED SYLLABUS

Contents: Theory Portion Unit Name of the Topics Hours **BASICS OF INDUSTRIES:** What is Industry? - Classification-Factors influence the location of the industries. Types of industries: Small Scale Industries: Definitions – procedure to start. Medium scale Ι 6 industries: Definition. Large scale industries: Definition. Manufacturing Industry - purpose of manufacture – global manufacture. Engineering Industry: Introduction – Products of various engineering sectors. INDUSTRIAL SAFETY AND MAINTENACE: Introduction - Safety equipment - Health and safety procedure - Personal Protective Equipment - Safe working practices - Safety Signs. Π Plant Maintenance: Introduction – objectives – importance. 6 Types of Maintenance: Break down maintenance – Preventive maintenance – Predictive Maintenance. TPM: introduction – objectives - Steps of TPM process. **OUALITY AND STANDARDS:** Definition of Quality – Total Quality Management - introduction – basic concepts – Quality Council - objectives. Ш 6 5S Principle – Sort, Set in Order, Shine, Standardise and Sustain. – Necessity of 5S – Six Sigma - Essential elements - Methodologies - Six Sigma belt. ISO standards – Intellectual Property Rights - Engineering Ethics. Brief description only. **BASICS OF ENGINEERING:** Tolerance - limits - Deviation - Allowance - Definitions only. Types of tolerances: Unilateral, Bilateral – Fits – Types of fits. List of important materials used for building construction - Requirements of water for construction. Mortar: Types and its properties. Concrete: constituents - requirements. Types of IV roofing – Types of foundation – requirements of good foundation – Standard sizes of doors and 8 windows. Weathering course: purpose – materials required. Earthquake: types of earthquake and its remedial measures. Rain water harvesting - types - importance. Electrical flux – electrical flux density – electrical field intensity – current – EMF – potential difference - resistivity - ohms law - work - power - energy - Kirchhoff's law - definitions only. **INDUSTRY 4.0** Industrial revolution – Definition - Industry 4.0 - Definition – Key trends. Components: Big data - Cloud computing - Internet of Things - Simulation - Autonomous Robots - Augmented V 6 reality - Cyber security - System integration - Additive manufacturing. Evolution of Industry 4.0 - Global readiness - Global trend - Initiative by industries and Government – Importance of Industry 4.0 **Reference Books:** Basic Manufacturing "Roger Timings" Third Edition - Newnes, An imprint of Elsevier. 1. Industrial Organisation and Engineering Economics - "T.R. Banga, S.C.Sharma"- Khanna 2. **Publishers** Industrial Engineering and Management "O.P.Khana" - Dhanbat Rai Publications. 3. Machine Drawing -K.L.Narayana, P.kannaiah, K.Venkatareddy – New Age International Publishers. 4.

- 5. Elements of Civil Engineering M.S.Palanisamy Tata Mc Grawhill Publication.
- 6. A TextBook of Electrical Technology B.L.Theraja, A.K.Theraja S.Chand & Company Ltd.
- 7. IJTSRD Conference Issue | March 2019 The Fourth Industrial Revolution (I4.0) in India Challenges
- & Opportunities by Viraj Vijay Jadhav, Ravindra Mahadeokar.
- 8. Industry 4.0 All India Management Association report.
- 9. CII Reports.

CONTENTS: PRACTICAL PORTION WORKSHOP PRACTICAL

Note:

1. The observation notebook or observation manual may be used. In the observation, the student should draw a diagram, mention the readings / observations, calculations and result manually. The same has to be evaluated for the observation mark.

2. The proper safety procedure and norms should be followed with proper uniform (Khaki pant & shirt) with shoes during the practices.

BASIC ENGINEERING MANUFACTURING PRACTICE

24Hrs.

(Tutorial – 6 Hrs. Practice – 18 Hrs.)

Objective:

- At the end of this course, the students will able to
- Know the basic workshop production processes and general safety precautions inside the shop.
- Read and interpret job drawings.
- Identify suitable marking and measuring tools for metal and wood materials.
- Select and use various cutting and filing tools for metal works.
- Select and use various chiselling and planning tools for woodworks.
- Learn different metal working operations like marking, cutting, filing, drilling, tapping etc.
- Understand different wood working operations like marking, planning, chiselling, sawing etc.
- Study and handle drilling machines and work holding devices.
- Produce jobs as per specified dimensions and inspect the job for the quality.
- Study the basic measuring instruments and measurements.

Skills:

- Ability to read job drawing
- Ability to identify and select proper material, tools, equipment and machine.
- Ability to set tools, work piece, and machines for desired operations.
- Ability to use safety equipment and follow safety procedures during operations.
- Ability to complete job as per job drawing in allotted time.
- Ability to measure and inspect the job for confirming desired dimensions and shape.
- Ability to acquire hands-on experience.

• Ability to use workshop practices in today's industrial and domestic life helps to dissolve the problems.

<u>Syllabus</u>

Introduction of Manufacturing: Definition – Type of manufacturing: Casting Process – Forming Process – Joining Process – Material removal process – Material addition Process.

Bench work: Metal work (Fitting) and Wood work (Carpentry) – Selection of material – Types of materials - Holding Devices - Striking Tools - Cutting Tools - Measuring and Marking tools- Power tools. Steps/procedures to prepare a part. Safety precautions in the workshop.

Exercises

Note: Practices should be given to cover all the operations. All the students should be given sufficient practice to do the below exercises for the board practical examinations. Importance should be given for the measurement and dimensions.

Exercise 1

Raw material: 75mm X 50mm X 3 mm thick M.S. flat – 1 No.



Exercise 2

All dimensions are in mm





All dimensions are in mm

Exercise 3

Raw material: 50mm X 40mm X 3 mm thick M.S. flat - 2 Nos



All dimensions are in mm




All dimensions are in mm





All dimensions are in mm

BASIC SERVICE AND MAINTENANCE PRACTICE

(Tutorial – 6 Hrs. Practice – 18 Hrs.)

Objective:

- At the end of this course, the students will able to
- Identify, select and use various wires and colour codes practiced in the industry.
- Adopt safety practices while working with electric power supply.
- Able to know about the basic tools and measuring equipment.
- Understand the importance of earthing.
- Identify and make use of different electrical fittings and accessories.
- Read and understand circuit diagram and symbols.
- Practice simple wiring based on the circuit.
- Ability to use multimeter for measurements.
- Identify, select and use various plumbing tools and components
- To install pipes and accessories.
- To repair or replace components In case of water leakages.
- To make use of PVC pipes, pipe fittings and accessories.
- To know about different plumbing layouts and pipe joints.
- Pipe threading using standard die sets.

Skills:

- Ability to read circuit diagram.
- Ability to identify and select proper wires and tools.
- Ability to follow safety procedures during work.
- Ability to complete connections as per circuit in allotted time.
- Ability to check the connections and measure the voltage.
- Ability to read layout diagram.
- Ability to identify and select proper pipes, accessories and tools.
- Ability to follow safety procedures during work.
- Ability to complete connections as per layout in allotted time.
- Ability to check the leakages in connections.
- Ability to acquire hands-on experience

SYLLABUS:

Electricity - Ohm's Law - current – voltage - resistor – capacitor – inductor - Wiring materials – Conducting materials - Insulating materials - Semiconductor materials - Types of switches – Types of holders – wiring accessories and tools – types of casings – MCB – types of wiring - Wiring colour codes. Distribution Board – Types of wiring circuit - Electrical hazard - First Aid for Electrical Emergencies, Rescue techniques. Lux: Definition – Use. Earthing: different methods – Importance – how to Improve earth resistance - Earth Leakage circuit breaker (ELCB) - BIS provision.

Plumbing: Introduction- important equipment, tools and accessories for installation and service in piping systems- plumbing fixtures. Pipes: types of materials - Pipe fittings - Power tools. Marking and measuring tools

Note: Students should draw the circuit diagram / block diagram and collect the components according to their requirement. The connections should be done by the student on a board and should be verified. Suitable safety precautions should be made accordingly.

Exercise 6:

Draw the circuit and connect the LED bulb, Tube light and one plug point socket with individual switch control in a board. Measure the current and voltage for various loads.

Exercise 7:

Draw the circuit and connect two lamps in series and parallel with switch control in a board. Measure the current and voltage.

Exercise 8:

Draw the circuit and connect stair case wiring for a LED bulb using two-way switches In a board.

Exercise 9:

Draw a block diagram and install a sink / wash basin with tap using PVC pipe and accessories such as gate valve, bend / elbow, tee, coupling, water meter etc.with draining system.

Exercise 10:

Draw a block diagram and provide the tap connection with the water meter and gate valve from the overhead tank and rectify the leakages in the tap and pipeline. Also measure the flow through the water meter.

Internal Mark Allocation

Assignment (Theory portion) *		- 20
Practical (Observation (5) and Record work (5))	- 20	
Attendance	- 20	
Total	- 60	

Note: * Three assignments should be submitted. The same must be evaluated and converted to 10 marks.

Guidelines for assignment: First assignment – Unit I & II Second assignment – Unit III & IV Third assignment – All Units Each assignment should have five two marks questions and two five marks questions.

BOARD EXAMINATION

Note :

1. The students should be taught theory portion and proper training in all the exercises. All the portions should be completed before examinations.

2. The students should maintain theory assignment, observation notebook / manual and record notebook. The assignment and record note book should be submitted during the Board Practical Examinations.

3. The question paper consists of theory and practical portions. All students should write the answers for theory questions (45 Marks) and any ONE exercise (50 Marks) should be completed for board examinations.

4. All exercises should be given in the question paper and students are allowed to select by lot. If required the dimensions of the exercises may be varied for every batch. No fixed time allotted for each portion and students have liberty to do the examination for 3Hrs.

5. For theory question and answer: 45 Marks Ten questions will be asked for 2 marks each. Two questions from each unit. ($10 \times 2 = 20$). Five questions will be asked for 5 marks each. One question from each unit. ($5 \times 5 = 25$)

6. Required instruments / equipment / tools should be available for the batch strength as prescribed for practice and examination.

7. The external examiner should verify the availability of the equipments / instruments for the batch strength before the commencement of Practical Examination

DETAILED ALLOCATION OF MARKS

	Description				Marks
А	Theory Question and Answer $(5 \times 9 = 45 \text{ Marks})$			45	
	Basic		Basic Se	rvice	
	Engineering	(Or) and Maintenance		ance	
	Production		Practice		
	Practice				
В	Marking, Cutting /	Circuit diagram / Block	15	50	
	Planning. Tools list	15	Diagram. Tools list	15	
	Filing / Chiselling,	25	Connection Checking	25	
	Dimensions	23	25 Connection, Checking	23	
	Finish	10	Finish	10	
С	C Viva voce		5		
		TOTAI	-		100

TOOLS REQUIRED

	4 - 3 -
Bench Vice - Fitted in the work bench	15 Nos.
Carpentry Vice - Fitted in the work bench	10 Nos.
Drilling machine (Separate in the First Year)	2 Nos.
Wiring board with stand	10 Nos.
Plumbing board with stand	10 Nos.
File flat 150 mm rough	10 Nos.
Fie flat 150 mm smooth	10 nos.
File flat 300mm rough / smooth	5 Nos. each
File round 150mm rough / smooth	5 Nos. each
File triangular 150mm rough / smooth	10 Nos. each
File half round 150 mm rough / smooth	10 Nos.
Steel rule 300 mm	30 Nos.
Vernier caliper	10 Nos.
Vernier height gauge	3 Nos.
Try square 200 mm	20 Nos.
Scriber	10 Nos.
Marking Gauges	10 Nos.
Mortise gauge	5 Nos.
Divider	10 Nos.
Caliper Inside and Outside	10 Nos. each
Spring Caliper	10 Nos. each
Carpenters folding rule	10 Nos.
Saws	5 Nos.
Tenon saw	5 Nos.
Bow saw	5 Nos.
keyhole saw	5 Nos.
Firmer chisel	10 Nos.
Beveled chisel	10 Nos.
Mortise chisel	10 Nos.
Jack plane	10 nos.
Screw Driver 100 mm	10 Nos.
Cutting Pliers insulated	10 Nos.
Knife Electrician D.B.	10 Nos.
Hammer Ball peen. 0.25 Kg	10 Nos.
Plumb bob 115 grams	5 Nos.
Neon tester pencil bit type 500 volt	10 Nos.
Spanner set DE Set of 6 from 6x7 to 16x7	5 Nos.
•	

•	Spanner set Ring Set of 6 from 6x7 to 16x7	5 Nos.
•	Pliers flat nose insulated 150mm	5 Nos.
•	Pliers round nose insulated 200mm	3 Nos.
•	Pliers long nose insulated 200mm	3 Nos.
•	Screw driver heavy duty 200mm	3 Nos.
•	Screw driver heavy duty 300 mm	3 Nos.
•	Screw driver set 100-300 mm	5 Nos.
•	Soldering iron 60 w/230 v	5 Nos.
•	Centre punch 100mm	10 Nos.
•	Wooden mallet 1 kg	10 Nos.
•	Firmer chisel 1"	10 Nos.
•	Firmer chisel ¹ / ₂ "	10 Nos.
•	Hammer Ball Peen 0.50 kg.	10 Nos.
•	Hammer cross Peen 0.50 kg.	5 Nos.
•	Adjustable spanner 300mm	3 Nos.
•	Allen keys Set 5 to 11 2 set Spirit level 300mm	3 No.
•	Rubber gloves 5000 volts	10 pairs
•	Multi meter AC/DC	5 Nos.
•	Water meter	2 Nos.
•	Electrical hand power drilling machine 12mm	1 No.
•	Megger (Insulation tester) 500 volts	1 Nos.
•	Pipe cutting machine	2 Nos.
•	Pipe bending machine	2 Nos.
•	Rubber matting 2meter x 1meter x 9mm	2 nos.
•	Fire extinguishers Dry chemical 5 Kg	4 Nos.
•	Consumables	Required quantity
•	Additional tools and instruments	Required quantity
· —		

(To complete the exercises)

SEMESTER - III

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030310

Semester : III

Subject Title : ELECTRONIC DEVICES AND CIRCUITS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

Subject	Instructions			Examination	ı	
4030310	Hours	/		Marks		
ELECTRONIC DEVICES AND CIRCUITS	/ Week	Hours / Semester	Internal Assessment	Board Examinations	Total	Duration
	5	80	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Copics and Allocation of Hours:	

Unit No	Unit No Topics			
Ι	I Engineering Materials			
II	Deformation of Metals	15		
III	Geometrical Properties of Sections and Thin Shells	15		
IV	IVTheory of Torsion and SpringsVSF and BM Diagrams of Beams and Theory of Bending			
V				
	07			
	80			

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in the Electronics Industry. This is vital in R&D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Electronic Devices and Circuits. By studying this subject, they will be skilled in handling all types of electronic devices and able to apply the skill in electronics systems.

OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to:

- Know the importance of filters.
- Know the construction, working principle and applications of Zener diode.
- Know the construction, working principle and applications of Optoelectronic devices.
- Know the biasing methods of Transistors and their applications.
- Study the performance of special devices like UJT, FET.
- Study the Concept of Feedback, different types of Negative feedback connections.
- Know the Types of Transistor amplifiers, Transistor oscillators and their applications.
- Study the performance of Special semiconducting devices like SCR, DIAC, and TRIAC.
- Explain the concept of wave shaping circuits, Bistable Multivibrator and Schmitt trigger.
- Study the working principle of Clippers, Clampers, Voltage Multipliers and their applications.

Conter	its: Theory	
Unit	Name of the Topics	Time
I	 FILTERS, ZENER DIODES AND OPTO-ELECTRONIC DEVICES 1.1: FILTERS Definition - Types - Capacitor filter - Inductor filter - L section filter - Pi section and RC filter - Comparison and Applications of Filters 1.2: ZENER DIODE Construction, Working principle and Characteristics of Zener Diodes - Zener Breakdown-Avalanche breakdown - Zener diode as a Voltage regulator. 1.3: OPTO-ELECTRONIC DEVICES Definition - Types - Symbol, Working, Characteristics and Applications of LED, 7 Segment LED - Photo diode, Photo transistor and Opto - coupler. BIPOLAR JUNCTION TRANSISTOR (BJT), FIELD EFFECT TRANSISTOR 	15
Π	 (FET) AND UNI JUNCTION TRANSISTOR (UJT) 2.1: BIPOLAR JUNCTION TRANSISTOR Transistor biasing: Need for biasing - Types- Fixed bias, Collector to base bias and Self bias (Operation only, no derivation of circuit elements and parameters) – Define: Stability factor - Operation of Common Emitter Transistor as an Amplifier and as a switch. 2.2: FIELD EFFECT TRANSISTOR (FET) Construction – Working principle–Classification - Drain and Transfer Characteristics - Applications–Comparison between FET and BJT - FET amplifier (common source amplifier). 2.3: UNIJUNCTION TRANSISTOR (UJT) Construction-Equivalent Circuit-Operation-Characteristics-UJT as a relaxation oscillator. 	15
III	 FEEDBACK, AMPLIFIERS AND OSCILLATORS 3.1: FEEDBACK Concept - effects of negative feedback-Types of negative feedback connections - Applications 3.2: AMPLIFIERS Transistor amplifiers - Types - RC coupled amplifier - Working and Frequency response characteristics –Working of Common Collector Amplifier (Emitter follower) 3.3: OSCILLATORS Transistor oscillators–Conditions for oscillation (Barkhausen criterion)-Classifications– Hartley Oscillator– Colpitts Oscillator – RC Phase shift oscillator. 	15
IV	 SPECIAL SEMICONDUCTING DEVICES (SCR, DIAC AND TRIAC) 4.1:SCR (SILICON CONTROLLED RECTIFIER) Symbol – Layered Structure – Transistor analogy - Working–VI characteristics– Applications - Comparison between SCR and Transistor 4.2: DIAC (Diode for Alternating Current) Symbol – Layered structure - Working – VI characteristics- Applications 4.3: TRIAC (Triode for Alternating Current) Symbol – Layered structure - Working – VI characteristics- Applications 	14
V	 WAVE SHAPING CIRCUITS 5.1: CLIPPERSAND CLAMPERS Construction and working of Positive, Negative and biased Clippers - Construction and working of Positive and Negative Clamper 5.2: Voltage Multipliers Construction and working of Voltage Doubler and Tripler. 5.3: Multivibrator and Schmitt Trigger Construction – Working – Waveform of Astable and Monostable Multivibrator using Transistors and Schmitt Trigger using Transistors. 	14

TEXT BOOKS:

1. Electronics Devices & Circuits by Salivahanan S,N.Suresh Kumar, A.Vallavaraj Tata McGraw Publication 3rdEdition 2016

2. Electronics Devices & Circuits by Jacob Millman and Halkias 3rd Edition, 2010, Tata McGraw– Hill publication

REFERENCE BOOKS:

1. Electronics Devices & Circuits by Salivahanan S,N.Suresh Kumar, A.Vallavaraj Tata McGraw Publication 3rdEdition 2016.

- 2. Electronics Devices and circuit theory by Boylestad & Nashelsky, PHI, New Delhi 2009
- 3. Electronic Principles by Malvino, -Tata McGraw Hill Publication 2010.
- 4. Optical Fiber Communication by Gerd Keiser 5th Edition, Tata McGraw–Hill.

Course Name Subject Code Semester Subject Title

- : Diploma in Electrical and Electronics Engineering
- : 4030320
 - : III

: ELECTRICAL CIRCUIT THEORY

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

			weeks			
Subject	Instructions			Examination		
4030320	Houng	Houng /		Marks		
ELECTRICAL		Hours /	Internal	Board	Tatal	Duration
CIRCUIT	/ week	Semester	Assessment	Examinations	Total	
THEORY	6	96	40	100*	100	3Hrs
THEORY 1	U	70	40	100	100	51115

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

	Topics and Anocation of Hours.						
Unit No	Topics	Hours					
Ι	DC Circuits	18					
II	Circuit Theorems	18					
III	Single Phase Circuits	18					
IV	Three phase Circuits	18					
V	Storage Batteries	17					
	Test and Model Exam	7					
	Total	96					

Topics and Allocation of Hours:

RATIONALE:

• Electric circuit analysis is the process of finding the voltages across, and the currents through the components in the network. Many Techniques are available for calculating these values.

• Part of the course deals with basics of Network Analysis, introduction to network elements and explains methods for finding voltage and current across any network Component with DC Source, Single Phase AC and Three Phase AC Sources.

• This Course aims at making the student conversant with different techniques of solving the problems in the field of Electric Circuits and Analysis.

OBJECTIVES:

The students should be able to:

• Explain the concept of Resistance, Capacitance and analyze different Circuit Elements, Energy Sources and analysis of Networks by Kirchhoff's Laws.

- Analyze the concepts of Nodal and Mesh Analysis and Analyze different Theorems for DC Circuits.
- Analyze Single Phase Circuits using Resistor, Inductor & Capacitor Elements.

• Analyze Balanced Three Phase AC Circuits and perform the Three Phase Power Measurement Calculations.

• Explain the Concept of storage batteries, care, maintenance and applications.

DETAILED SYLLABUS				
Unit	Name of the Topics	Time		
Ι	DC CIRCUITS Basic Concepts of Current, EMF, Potential Difference, Resistance and Resistivity– Ohm's Law –Work, Power, Energy- Resistance in Series, Parallel and Series - Parallel Circuits – Kirchhoff's Laws – Concept of Capacitance - Capacitors in Series and in Parallel - Problems in the above Topics.	18		
II	CIRCUIT THEOREMS	18		

		Definitions of Node, Branch and Network – Mesh Equations–Nodal Equations–Star / Delta	
		Transformations - Superposition Theorem - Thevenin's Theorem - Norton's Theorem -	
l		Maximum Power Transfer Theorem. (Problems in DC Circuits only)	
		SINGLE PHASE CIRCUITS	
		Definitions of Sinusoidal Voltage and Current–Instantaneous, Peak, Average and Effective	
		Values – Form Factor and Peak Factor (Derivation for Sine Wave) – Pure Resistive, Inductive	10
		and Capacitive Circuits - RL, RC, RLC Series Circuits - Impedance - Phase Angle - Use of	
	III	'J' Notations-Rectangular and Polar Coordinates - Phasor Diagram. Power and Power Factor	
		- Power Triangle - Apparent Power, Active and Reactive Power- Parallel Circuits (Two	
		Branches Only)- Conductance, Susceptance and Admittance–Problems in all above topics.	
		RESONANCE	
l		Concept of Series Resonance – Parallel Resonance (R, L & C)- Applications (No Problems	8
		THREE PHASE AC CIRCUITS	
		Three Phase AC Systems-Phase Sequence –Necessity of Three Phase System–Concept of	
		Balanced and Unbalanced Load - Balanced Star & Delta Connected Loads–Relation between	8
	IV	Line and Phase Voltages and Currents – Phasor Diagram	
		Three Phase Power – Power Factor – Three Phase Power and Power Factor Measurement by	10
		Single Wattmeter and Two Wattmeter Methods–Problems in all Topics.	10
		SIUKAGE BAITERIES	
		classification of cens – Construction, Chemical action and physical changes during charging and discharging of L and Agid. Nickel Iron and Nickel Codmium Calls – Advantages and	
		Disadvantages of Nickel Ion and Nickel Cadmium Cells over Lead Acid Cell indication of	
	V	fully charged and discharged bettery defects and their remedies canacity AH afficiency	17
	v	and WH efficiency (no problems) methods of charging care and maintenance	17
		and will efficiency (no problems) – methods of charging - care and maintenance – applications maintenance free batteries. Lithium Cells Lithium Jon Cells and Mercury	
		Cells – Concept of Recharged Cell	
н	1		

TEXT BOOK:

S.No	Name of the Book	Author	Publisher	
1.	Electric Circuit Theory	Dr.M.Arumugam	Khanna Publishers	

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1.	Circuits and Networks Analysis	A Sudhakar Shyammohan S	Tata McGraw
	and Synthesis	Palli	Hill Education Private
2.	Electric Circuita	Mahamood Nahvi Joseph A	Schaum Publishing Company,
	Electric Circuits	Edminister	Newyork

Course Name Subject Code Semester Subject Title : Diploma in Electrical and Electronics Engineering

: 4030330

: III

: ELECTRICAL MACHINES-I

TEACHING AND SCHEME OF EXAMINATION

				No of	weeks pe	er semester: 16 week
Subject	Instr	uctions		Examina	tion	
	Houng	Houng /		Marks		
4030330 ELECTRICAL	/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration
MACHINES-I	5	80	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Topics and Allocation of Hours:

Unit No	Topics	Hours
Ι	DC Generator	15
II	DC Motor	15
III	Single Phase Transformer	15
IV	Three phase Transformer	15
V	Maintenance of DC Machines and Transformers	13
	Test and Model Exam	7
	Total	80

RATIONALE:

• This subject is classified under the core technology group which intends to teach the facts, concepts, principles of electrical machines, such as DC generators, DC motors, Brushless DC motor, Single & Three Phase Transformers and DC Electrical Source (battery).

• Students will be able to analyze the characteristics of DC Generators and Motors, Brushless Dc Motor, Single & Three Phase Transformer, Battery & Qualitative Parameters of these Static and Dynamic Machines. These Machines are used in Transmission, Distribution and Utilization Systems.

• Knowledge gained by students will be helpful in the study of advanced subjects like Utilization of Electrical Energy, Switchgear & Protection, Manufacturing Processes and Maintenance of Electrical Machines.

OBJECTIVES

Contents Theory:

Students will be able to:

- Explain the concept Electromagnetism and Principles
- Know the constructional details and working principles of DC Machines and Transformers
- Evaluate the performance of DC Generators, Motors and Transformers .
- Study the applications of DC Generator, Motor and Transformer for specific fields.

DETAILED SYLLABUS

Unit	Name of the Topics	Time
I	DC GENERATORS Review of electromagnetic induction – Faraday's laws –Lenz's law - Fleming's right hand rule – Principle of operation of D.C. generator –Construction of D.C. generator – Types of armature windings(No Winding diagram) – EMF equation(Simple problems) –Types of D.C. generators – No load and load characteristics of DC generators – Causes of failure to build-up voltage and remedy – armature reaction – methods of compensating armature reaction – process of commutation – methods of improving commutation. Load characteristics of DC generators.	15
II	DC MOTORS Principle of operation of D.C. Motor – Fleming's left-hand rule – Construction Back emf – Torque equation – Types of DC motors –Torque-current, Speed-current, Speed- Torque characteristics of different DC motors – Speed control of DC motors– Field control and	15

	armature control – necessity of Starters– 3 Point and 4 Point starters –losses in D.C. Machines – Testing of D.C. Machines – Predetermination of efficiency of motor and generator by Swinburne's test – Problems in the above topics – Applications of D.C. Motors.	
ш	SINGLE PHASE TRANSFORMER Principle of operation – Constructional details of core and shell type Transformers – EMF Equation – Voltage ratio –Transformer on No load – Transformer Full load – Current ratio – Phasor diagram on no load and Full load at different power factors. O.C. test, S.C. test – Determination of equivalent circuit constants– Determination of voltage regulation and efficiency – Condition for maximum efficiency– All day efficiency – Problems on the above topics - polarity test–Parallel operation of Single Phase transformers– Auto transformer – principle – Applications of transformers – Energy Efficient Transformer – Dry Type Transformer & Amorphous Core Transformer.	15
IV	THREE PHASE TRANSFORMER Three phase Transformer – construction, types of connections of transformer. Parallel operation of three phase transformers – grouping of transformers – Pairing of transformers - Load sharing of transformers with equal and unequal ratings –Cooling of transformers – Various cooling arrangements – Transformer accessories – conservator, breather, explosion vent, bucholz relay – ON load and OFF load tap changer.	15
V	 MAINTENANCE OF DC MACHINES AND TRANSFORMERS Maintenance – Importance, Preventive and Breakdown maintenance - Advantages of preventive maintenance - Causes of Sparking in Commutators – Defects in Commutators and Remedies – Resurfacing of Commutators and Brushes – Maintenance of Brush Holder – Staggering of Brushes, Brush Pressure - Defects in DC Armature winding – Maintenance of Earthing of DC Machines. Maintenance of Transformer Oil - Transformer oil tester – Acidity test, BDV Test - Earthing – Measurement of earth resistance. 	13

TEXTBOOK:

S.No	Name of the Book	Author	Publisher
1.	A Textbook of Electrical Technology Volume II	B.L. Theraja	S.Chand & Co.New Delhi
2.	Electrical Technology	Edward Hughes	Addision – Wesley International Student Edition

REFERENCE BOOKS:

S.No	Name of the Book	Author	Publisher
1.	Elements of Electrical Engineering	Maria Louis	Prentice - Hall of India Pvt
2.	Electrical Machines	Nagrath	TMH Publications
3.	Electrical Machines	Bhattachary	TMH Publication

Course Name Subject Code Semester Subject Title : Diploma in Electrical and Electronics Engineering

: 4030340

: III

: ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

			weeks			
Subject	Subject Instructions Examination					
4030340	Hound			Marks		
ELECTRONIC		Hours /	Internal	Board	Total	Duration
DEVICES AND	/ WEEK	Semester	Assessment	Examinations	Total	
CIRCUITS	4	64	60	100*	100	2U ng
PRACTICAL	4	04	00	100.	100	JHIS

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in the Electronics Industry. This is vital in the R & D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, electronic devices and Circuits Practical. By doing practical experiments in this, they will be skilled in handling all types of electronic circuits and able to apply the skill in electronic systems.

OBJECTIVES:

On completion of the following experiments, the students must be able to

- Know the Cold Checking of Active and Passive Component
- Find out the Unknown Resistance value of a Resistor using Colour Coding.
- Find out the Unknown Capacitance value of a Capacitor using Colour Coding
- Find out the Unknown Inductance value of an Inductor using Colour Coding
- Understand the concept, working principle and applications of PN Junction diode.
- Understand the concept, working principle and applications of Zener diode
- Understand the concept, working principle and applications of BJT and FET.
- Understand the concept, working principle and applications of UJT.
- Understand the concept, working principle and applications of SCR.
- Understand the concept, working principle and applications of DIAC and TRIAC.
- Understand the concept, working principle and applications of Clippers and Clampers.
- Understand the concept, working principle and applications of various types of Negative feedback amplifiers.
- Understand the concept, working principle and applications of Astable Multivibrator.

DETAILED SYLLABUS

Contents: Practical

Exercises

Note: At least 5 experiments should be done using Soldering board / Bread board

1. Construct a circuit to test the forward and reverse bias characteristics of a PN Junction Silicon diode. Find the value of its cut-in voltage

2. Construct a circuit to test the forward and reverse bias characteristics of a Zener diode. Find the value of its reverse breakdown voltage

3. Construct a Full wave (center tapped) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.

4. Construct a Full wave (Bridge) rectifier and test its input and output waveforms with and without Capacitor filter. Find its maximum voltage.

5. Construct a Common Emitter Transistor circuit and test its input and output characteristic curves.

6. Construct a Common Source Field Effect Transistor circuit and test its drain and transfer characteristic curves.

7. Construct a circuit to test the Turning on and Turning off characteristics of SCR and find out the forward break over voltage, the value of Latching and Holding currents.

8. Construct a circuit to test the bidirectional characteristics of DIAC and plot its switching characteristics.

9. Construct a circuit to test the bidirectional characteristics of TRIAC and plot its switching characteristics. 10. Construct a Common emitter amplifier circuit and test its frequency response characteristics with and without Current series feedback introduced in it.

11. Construct a circuit to test the switching characteristics of Astable Multivibrator

12. Construct a circuit to test the negative resistance Characteristics of UJT.

S.No	Name of the activity	Mark Allocation			
1	CIRCUIT DIAGRAM	25			
2	CONNECTIONS	25			
3	EXECUTION AND HANDLING OF EQUIPMENT	25			
4	OUTPUT / RESULT	25			
5	VIVA VOCE	10			
	Total	100			

DETAILED ALLOCATION OF MARKS

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

Si. No	Name of the equipment	Range	Required Quantity
1	DC Regulated Power Supply	0-30V, 1A	10
2	High voltage Power Supply	0-25V, 1A	2
3	Signal Generator	1MHZ	4
4	Dual Trace CRO	20MHZ / 30MHZ	5
5	Digital Multimeter	-	10
6	DC Voltmeter (Analog/Digital)	Different Ranges	15
7	DC Ammeter (Analog/Digital)	Different Ranges	15

Course Name Subject Code Semester Subject Title

- : Diploma in Electrical and Electronics Engineering
- : 4030350
- : III

: ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

weeks						
Subject	Instructions		Examination			
	Houng	Houng /		Marks		
4030350 ELECTRICA	/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration
L CIRCUITS AND MACHINES PRACTICAL	4	64	60	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

• To impart Practical Knowledge to the Diploma Students and Practical Subjects are introduced for every corresponding theory Subject.

• This Practical Course supports the aim and objective of Electrical Machines- I and Electrical Circuit Theory Subjects.

OBJECTIVES:

- On completion of this Practical Subject, the Students will be able to:
- Make the various Circuit connections in the Machines Laboratory.
- Practically prove all the Theorems and Principles which are dealing with DC Current.

• Understand the Characteristics of Electrical Machines and to determine the Efficiency of the Machines.

• Test the performance of the Transformer to find its Efficiency, Voltage Regulation and Characteristics.

• Study the various Speed Control Methods of DC Motor.

ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

LIST OF EXPERIMENTS:

- 1. Verification of Superposition Theorem with two different DC Voltages for a common load.
- 2. Verification of Thevenin's Theorem with DC Supply
- 3. Measurement of Power
- a. Using Ammeter and Voltmeter
- b. Using Wattmeter for Single Phase Resistive Load.

MACHINES:

- 4. No load and FULL Load Characteristics of Self Excited DC Shunt Generator.
- 5. Load Characteristics of Self Excited DC Series Generator.
- 6. Load Test on DC Shunt Motor and Draw the Performance Curve.
- 7. Load Test on DC Series Motor and Draw the Performance Curve.
- 8. Predetermine the Efficiency of DC Machines by Swinburne's Test.
- 9. Speed Control of DC Shunt Motor by a. Armature Control Method
- a. Armature Control Method
- b. Field Control Method
- 10. Load Test on Single Phase Transformer
- 11. Load Test on Three Phase Transformer
- 12. Predetermine the Efficiency and Regulation of Single-Phase Transformer by conducting O.C and S.C Tests.
- 13. Find the Equivalent Circuit Constants of Single-Phase Transformer by conducting O.C and S.C Tests.
- 14. Connect two Single Phase Transformers for Parallel Operation.

15.

a) Perform Breakdown Test And determine the Dielectric Strength of Transformer Oil

b) Conduct Acidity Test on Transformer Oil.

DETAILED ALLOCATION OF MARKS

S.No	Name of the activity	Mark Allocation
1	CIRCUIT DIAGRAM	35
2	CONNECTIONS AND PROCEEDING THE EXPERIMENT	30
3	READING CALCULATION/GRAPH/RESULT	25
4	VIVA VOCE	05
	Total	100

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

Si. No	Name of the equipment					
1	DC Shunt Motor 3/5 KW (or more) with Loading Arrangement	2				
2	DC Series Motor 3/5 KW (or more) with Loading Arrangement	1				
3	DC Compound Motor 3/5 KW (or more) with Loading Arrangement	1				
4	DC Shunt Generator 3/5 KW (or more) coupled with Prime Mover	1				
5	DC Series Generator 3/5 KW (or more) coupled with Prime Mover	1				
6	1 Phase Transformer 1KVA (or more) 220V/110V	3				
7	3 Phase Transformer 1KVA (or more) 440V/220V	1				
8	1 Phase Variac 15 amps	3				
9	3 Phase Variac 15 amps	1				
10	Dual Regulated Power Supply 0-30V/2A	2				
11	Single Regulated Power Supply 0-30V / 2A	2				

12	Single Phase Resistive Load 3/5 KW, 220V	2
13	Three Phase Resistive Load 3KW,415V	2
14	Tachometer Analog type	
15	Rheostat – various ranges $50\Omega/5A$, $100\Omega/5A$, $300\Omega/2A$, $600\Omega/2A$ (or	4
	equivalent)	
16	AC Ammeter – various ranges 0-500mA,	8
	0-1/2A, 0-5/10A, 0-10/20A (or equivalent)	
17	DC Ammeter – various ranges 0-500mA, 0-2A,0-5A,0-10A,0-15/30A (or	8
	equivalent)	
18	DC Voltmeter – 0-5/10V, 0-30V, 0-300V	8
19	AC Voltmeter – 0-75V, 0-150V, 0-300V, 0-600V	8
20	Wattmeter – various ranges LPF 150/300/600V 2.5A/5A,1/2.5A	6
21	Wattmeter – various ranges UPF 75/150/300,5/10A	6
22	Wattmeter – various ranges UPF 150/300/600V 10/20A	6
23	Transformer oil tester kit, Acidity test kit	Each 1

Course Name: Diploma iSubject Code: 4030360Semester: IIISubject Title: ELECTR

: Diploma in Electrical and Electronics Engineering

: ELECTRICAL WORKSHOP PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

weeks							
Subject	Instructions		Examination				
4030360	Uoum	Hours /		Marks		Duration	
ELECTRICAL	/ Week	Semester	Internal	Board	Total		
WORKSHOP	/ /////	Semester	Assessment	Examinations	Total		
PRACTICAL	4	64	60	100*	100	3Hrs	

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

• To impart practical knowledge to the Diploma Students for servicing of Domestic Appliances

• This Subject is assigned to develop Skill on Assembling and test the Household Electrical Appliances.

OBJECTIVES:

At the end of the practical the students will be able to:

- Identify and use the tools used in servicing of Electrical Appliances:
- Assemble the various parts of Domestic Appliances.
- Make the Electrical Connections and test their performance.

LIST OF EXPERIMENTS

14

Induction Heater

1. Familiarization of tools used for Electrical repair works and personal Protection Equipments.

Dismantling of Electrical Iron Box, identifying the parts, checking the conditions, assembling, and 2. testing.

Dismantling of Mixer Grinder, identifying the parts, checking the conditions, assembling and 3. testing.

Dismantling of Wet Grinder, identifying the parts, checking the conditions, assembling, and 4. testing.

5. Assembling the accessories of Ceiling Fan, test the connections of winding & Capacitor and run the Fan with Speed Regulator.

Connect the Battery and Inverter to supply partial load in a Domestic Wiring during Mains Failure. 6.

7. Assembling and testing of 15 watts LED Light.

Battery Charging through Solar Panel. Connect Solar Panel to charge Battery through Charge 8. Controller.

9. Dismantling of Induction Heater, identifying the parts, checking the conditions, assembling, and testing.

Dismantling of Microwave Oven, identifying the parts, checking the conditions, assembling and 10. testing.

Name of the equipment **Required Quantity** S.No Tools: Screwdriver, Cutting pliers, Wire Stripper, Hammer, Spanner set, 1 Each 2 set Line Tester, Nose pliers. Personal Protective Equipments: Safety helmet, Google, Safety gloves, Nose 2 Each 2 set mask, Ear plug, Safety Belt. Automatic Iron Box 3 2 Wet Grinder 2 4 2 5 Mixer Grinder Ceiling Fan 2 6 7 LED Light, PCB, Driver Circuit and Outer Cover 10 8 Lead Acid Battery 2 9 Inverter 2 Solar Photo Voltaic Module 10 2 Charge controller 2 11 12 Microwave oven 1 13 Multi meter 8

LIST OF EOUIPMENTS (FOR A BATCH OF 30 STUDENTS)

DETAILED ALLOCATION OF MARKS

1

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	CONNECTION DIAGRAM	25
2	TOOLS REQUIRED	20
3	DISMANTLING AND ASSEMBLING PROCEDURE	30
4	TESTING	20
5	VIVA VOCE	05
	TOTAL	100

- Course Name : Diploma in Electrical and Electronics Engineering
- Subject Code : 4030370
- Semester : III

Subject Title : WIRING & WINDING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

weeks

No of weeks per semester: 16

			WCCKB				
Subject	Instr	uctions		Examination			
4020270				Marks			
4050570 WIRING & WINDING	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	Duration	
PRACTICAL	4	64	60	100*	100	3Hrs	

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

To provide concept and hands on experience in Electrical Wiring and Winding including different Wiring Systems, Installation Methods and Basic Winding Preparation. Each topic in the syllabus serves as a guide for students to deal with the process of connecting various accessories for the distribution of Electrical Energy from the Meter Board.

OBJECTIVES:

At the end of this Practical Course the Students should be able to:

- Execute the Emergency Alarm Circuit
- Execute the wiring for Single Phase Service Connection with necessary items.

• Execute the wiring of Three Phase Supply using 3 Rotary Switches, MCB and DB to change the Phases by connecting Single Phase Lamp Load

• Execute the wiring to control the intensity of Lamp by six places by using two 2- Way Switches and 4 Intermediate Switches.

• Execute the wiring to connect a Single-Phase Motor with Main Switch, D.O.L Starter and M.C.B

• Execute The Wiring to Connect A 3 Phase Induction Motor with Main Switch, Star / Delta Starter and E.L.C.B.

• Execute the wiring to control lamps (Sodium Vapor Lamp, Mercury Vapor Lamp, Fluorescent Lamp)

- Execute the wiring for the Test Board with necessary items.
- Execute the Go down /Tunnel wiring
- Prepare winding for Transformer and No Volt Coil.
- Give end connections for 3 Phase Induction Motor Winding.
- Testing of faulty Ceiling Fan.

Contents: Practical Name of the Topics: WIRING

1. Emergency alarm wiring with 3 Bells and 3 Pushbuttons.

2. House Wiring for a Service Connection with Single Phase Digital Energy Meter Cutout, Main Switch, 4 Way D.B, Indicator Lamp.

3. Wiring and Testing of 3 Phase Supply using 3 Rotary Switches, MCB and DB to change the Phases by connecting Single Phase Lamp Load.

- 4. Controlling a Lamp by Six Places by using Two, 2-Way Switches & Four Intermediate Switches.
- 5. Wiring of Single-Phase Motor using Single Phase Main Switch, D.O.L Starter and MCB.
- 6. Wiring of Three Phase Induction Motor with Main Switch, Star/Delta Starter and ELCB.
- 7. Wiring of Sodium Vapor and Mercury Vapor Lamp.
- 8. Wiring and troubleshooting the Fluorescent Tube light.
- 9. Design and implement a Test Board with Indicator Lamp, Fuse Unit to Test Electrical Appliances.
- 10. Go down / Tunnel wiring using 4 Lamps. 1.

WINDING

- 1. Design, construct and test a 230/12-0-12 Volt, 500mA Transformer.
- 2. Design No Volt Coil for a 230/440 AC Contactor.

3. Demonstrate the end connection for a 3 Phase Induction Motor Winding for a 2 Poles / 4 Pole Operations.

4. Dismantling a faulty Ceiling Fan and identifying the fault, run the fan after rectifying the fault.

DETAILED ALLOCATION OF MARKS

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	WIRING DIAGRAM / DESIGN	30
2	EXECUTION	40
4	RESULT	25
5	VIVA VOCE	05
	TOTAL	100

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.No	Name of the equipment	SPECIFICATION	Required Quantity
1	SPST Flush Type Switch	250V/5A	10
2	Intermediate Switch	250V/5A	10
3	Rotary Switches	500V/32A	6
4	Three Phase Control Panel Board	500V/32A	2
5	Batten Lamp Holder	-	10
6	Round Block	-	20
7	Switchhoord	20cm*15 cm	4
/	Switchboard	10cm*10cm	15
0	MCP	250V/10A ,2 pole	6
0	M.C.D.	440V/32A	3
9	Push Button Switch	250V/5A	5
10	2 Plate Ceiling Rose	250V/5A	10
11	Electric Bell	250V/5A	3
12	Single Phase D.P.I.C. Main Switch	250V/16A	3
13	Single Phase D.O.L. Starter	250V/10A	1
14	Three Phase T.P.I.C. Main Switch	500V/30A	2
15	Star / Delta Starter	440V/5HP	1
16	E.L.C.B	30mA/100mA	1

17	Single Phase, Digital Energy Meter	250V/15A,50HZ	1
18	Cut out	16A	1
19	Single Phase, 4 Way Distribution Box	250V/15A	2
20	Mercury Vapor Lamp with accessories	-	1set
21	Sodium Vapor Lamp with accessories	-	1 set
22	Fluorescent Tube Light with Electronic Choke and Holder	40W	2 set
23	Two Way Flush Type Switch	250V/5A	15
24	Wooden Box	30 cm*15cm	4
25	PVC Pipe	³ /4"/1″	Req. Qty
26	Saddle Clips	³ /4 ^{''} /1 "	Req. Qty
27	Copper Wire	2.5Sq.Mm, 1.5Sq.Mm	Req. Qty
28	1" Junction Box	1 way,2way,3way	Req. Qty
29	Screws	-	Req. Qty
30	Bare Copper Wire	2.5 Sq.mm	Req. Qty
31	Lamps (C.F.L. or Incandescent)	Different ratings	Req. Qty
32	EI60 Type Stampings Of 0.35 Mm Thickness	-	55
33	Readymade Bobbins (EI60/21)	_	Req. Qty
34	Enameled Copper Wire	26 SWG 36 SWG 37 SWG 38 SWG	Req. Qty
35	Varnish	-	Req. Qty
36	Winding Machine	-	1
37	Ceiling Fan	-	2
38	Single Phase Induction Motor	0.5 HP/50HZ,240V	1
39	Three Phase Squirrel Cage Induction Motor	3HP, 500 V, 50 Hz	1
40	Gauge Plate for Measurement of SWG	-	1
41	Winding Study Motor (3Φ Squirrel Cage Type)	-	1

SEMESTER - IV

Course Name Subject Code Semester Subject Title Diploma in Electrical and Electronics Engineering
4030410
IV

: Electrical Machines – II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16

				weeks			
	Subject	Instr	uctions		Examina	tion	
	4020410	Houng	Houng /		Marks		
	4030410	Hours Hours	Hours /	Internal	Board	Total	Duration
	Electrical Machines II	/ week	Semester	Assessment	Examinations	Total	
	Machines – 11	5	80	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Topics and Allocation of Hours:					
Unit No	Topics	Hours			
Ι	Alternator Principles and Construction DC Circuits	12			
II	Alternator Performance and Testing	16			
III	Three Phase Induction Motor	16			
IV	Single Phase Induction Motor & Synchronous Motor	15			
V	Maintenance of Induction Motors & Starters	14			
Test and Model Exam 7					
Total					

RATIONALE:

• This subject is classified under Core Technology group intended to teach Students about facts, concepts, Principles of Electrical Machines such as Induction Motor, Alternator and Synchronous Motor.

- Students will be able to analyze the characteristics and qualitative parameters of these Machines.
- These Machines are widely used in Industries and for generation of electricity.

• The knowledge gained by the student is useful in the study of Technological Subjects such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical Machines.

• The knowledge and skills obtained will be helpful in discharging Technical Functions such as Supervision, Controlling and as R & D Technicians

OBJECTIVES:

The students will be able to understand the concepts of:

- Alternator Principle, Construction and their Types, EMF Induced and Cooling Techniques of Machines
- Performance of an Alternator, Testing, Characteristics, Parallel Operation, Load Sharing etc.,
- Three Phase Induction Motor, Principle, Construction, Types, Characteristics and Applications, Starting

Methods, Single Phase Motor Types, Construction, Characteristics and Applications, Synchronous Motor, Starting, Construction, Characteristics and Applications.

• Maintenance of Induction Motors and Starters.

Conte	nts: Theory	
Unit	Name of the Topics	Time
Ι	 ALTERNATOR PRINCIPLES AND CONSTRUCTION Basic Principle of Alternators – Types of Alternators – Stationary Armature Rotating Field – Advantages of Rotating Field – Construction Details of Alternator – Salient Pole Rotor – Cylindrical Type Rotor – Types of A.C. Armature Windings – Types of Slots – Full Pitch and Short Pitched Windings – Phase Spread Angle and Effect of Distribution Factor – Pitch Factor – Relation between Frequency, Speed and Number of Poles – EMF Equation – Problems Methods of obtaining Sine Wave – Critical Speed of Rotor – Ventilation of Turbo Alternators – Advantages of Hydrogen Cooling and its Precaution – Excitation and Exciters 	10
п	ALTERNATOR PERFORMANCE AND TESTING Load Characteristics of Alternators – Reason for Change in Terminal Voltage –Qualitative Treatment of Armature Reaction for various Power Factor Loads – Effective Resistance – Leakage Reactance – Synchronous Reactance, Synchronous Impedance – Voltage Regulation – Determination of Voltage Regulation of Alternator by Direct Load Test - Predetermination of Regulation of Alternator by Indirect Method (EMF, MMF, and ZPF). Necessity and conditions for Parallel Operation of Alternators – Synchronizing by Dark Lamp Method, Bright Lamp Method, Dark - Bright Lamp Method and Synchroscope Method–Synchronizing Current, Synchronizing Power and Synchronizing Torque – Load Sharing of Alternators –Infinite Bus Bar.	10 6
III	THREE PHASE INDUCTION MOTOR Rotating Magnetic Field – Principle of Operation of Three Phase Induction Motors – Slip and Slip Frequency – Comparison between Cage and Slip Ring Induction Motors – Development of Phasor Diagram – Expression for Torque in Synchronous Watts – Slip- Torque Characteristics – Stable and Unstable Region – No Load Test and Blocked Rotor Test – Development of Approximate Equivalent Circuit – Problems on the above Topics – Simplified Circle Diagram. Determination of Maximum Torque, Slip (Problems Not Required) – Starting Torque and Starting Current Expression – Relationship between Starting Torque and Full Load Torque – Speed Control of Induction Motors. Starters of Induction Motors – Direct online Starter and Its Merits for Cage Motors – Star Delta Starter- Auto Transformer Starter - Rotor Resistance Starter – Cogging –Crawling in Induction Motor– Double Cage Induction Motor-Induction Generator	10 6
IV	Single Phase Induction Motor – Not Self Starting – Methods of Making itself Starting – Construction, Working Principle – Phasor Diagram-Slip Torque Characteristics- Split Phase Motor - Capacitor Motor - Shaded Pole Motor - Repulsion Motor - Universal Motor – Operation of Three Phase Motor with Single Phase Supply. SYNCHRONOUS MOTOR	8
	Principle of Operation –Not Self Starting – Methods of Starting–Effects of Excitation on Armature Current and Power Factor– 'V' Curve and Inverted 'V" Curve of Synchronous Motor – The Phenomenon of Hunting and Prevention of Hunting by Damper Winding – Comparison between Synchronous Motor and Three Phase Induction Motor - Applications -Problems on Power Factor Improvement.	7
V	MAINTENANCE OF INDUCTION MOTORS AND STARTERS BIS Publication Dealing with The Code of Practice of Induction Motors and Starters – Classification of Cage Motor – Continuous Rating and Intermittent Rating – Various Types of Enclosures – Specifications of Motors – Selecting the Cable Rating – Single Phase Preventer using Current Operated Relay – Commissioning - Annual Maintenance Selection of Starters of Induction Motor – Common Induction Motor Troubles and their Remedies – Causes of Noise and Vibration – Care of Bearings – Static Balancing –	7

Degreasing – Vacuum Impregnation - Varnishing – Effect of Unbalanced Supply on the Performance of Induction Motor.	

7

TEXT BOOK:

S.No	Name of the Book	Author	Publisher
1.	A Textbook of Electrical Technology -Volume II	B.L. Theraja	S.Chand & Co. New Delhi
2.	Electrical Technology	Edward Hughes	Addision– Wesley International Student Edition

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1.	Performance and Design of AC Machines	M.G.Say	Pitman Publishing Ltd
2.	Electrical Machines	Nagrath	TMH Publications
3.	Electrical Machines	Bhattacharya	TMH Publications

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 4030420

Semester : IV

Subject Title : MEASUREMENTS, INSTRUMENTS AND TRANSDUCERS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16						ster: 16 weeks
Subject Instructions			Examinatio	n		
4030420	Uoum	Hours /		Marks		
MEASUREMENTS,	/ Wook	Hours /	Internal	Board	Total	Duration
INSTRUMENTS AND	/ Week	Semester	Assessment	Examinations	Total	Duration
TRANSDUCERS	5	80	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Topics and Allocation of Hours:

Unit No	Topics	Hours
Ι	Classification and Characteristics of Instruments	15
II	Measurement of current Voltage and Resistance	15
III	Measurement of Power, Power Factor and Frequency	15
IV	Measurement of L, C Parameters, Waveforms and Signal Conditioners	13
V	Sensors and Transducers	15
	Revision and Test	07
	80	

RATIONALE:

Measurement is the basic and primary operation, the result of which is used only to describe the system and hence treated as an independent operation. Automation of any kind begins with the measurement of certain system parameters; In fact, Industrial growth moves hand in hand with the growth of the measurement of Science and Technology. Therefore, it is highly essential for Electrical Students to study about the measurement of various Electrical Parameters in a system and the construction and working of different Instruments used in measurement of such parameters.

OBJECTIVES

At the end of the Semester, Students will be able to:

- To define basic measurement terms.
- To learn about various operating Forces and effects used in Instruments.
- To study the construction and working of Moving coil and Moving Iron instruments, CT and PT and Electrostatic Voltmeter.
- To understand the measurement of Resistance using different means.
- To study Single Phase and Three Phase Power Measurement using Wattmeter.

• To study the construction and working of Single Phase, Three Phase Energy Meter and study about calibrations.

- To study the construction and working of Power Factor Meters, and Phase Sequence Indicators.
- To study about the Frequency Measurement using different types of Frequency Meters.
- To learn about the measurement of Inductance and Capacitance using Bridges.
- To study about CRO and its applications.

CONTE	2NTS: Theory	
Unit	Name of the Topics	Time
I	CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS General - Definition of Measurement – Functions of Measurement System (Indicating, Recording and Controlling Function) – Applications of Measurement Systems – Classification – Absolute and Secondary Instruments – Indicating Recording and Integrating Instruments –Analog and Digital Definition of True Value, Accuracy, Precision, Error and Error Correction – Instrument Efficiency – Effects used in Instruments – Operating Forces – Deflecting, Controlling Force (Spring Control, Gravity Control) and Damping Forces (Air Friction, Fluid Friction and Eddy Current Damping)	15
п	MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE Types of Instruments – Construction, Working and Torque Equation of Moving Coil, Moving Iron, Dynamometer Type (Shaded Pole) Instruments – Extension of Instrument Range Using Shunts and Multipliers. (Calculation, Requirements and Simple Problems). Tong Tester – Electrostatic Voltmeter – Rectifier Type Instruments –Instruments Transformers CT and PT – Testing, Errors and Characteristics of CT and PT. Classification of Resistance – Measurement using Conventional Method – (Ammeter – Voltmeter Method) Measurement of Low Resistance using Kelvin's Bridge Ohmmeter – Measurement of Medium Resistance using Wheatstone Bridge – High Resistance using Megger - Earth Resistance – u Earth Tester – Multimeters.	15
ш	MEASUREMENT OF POWER, POWER FACTOR AND FREQUENCY Power in D.C and A.C Circuits – Watt Meters in Power Measurement –Measurement of Energy in AC Circuits – Single Phase and Three Phase Energy Meters Construction and Operation – Digital Energy Meter. Power Factor Meters – Single Phase Electrodynamometer Type – Construction and Working – Phase Sequence Indicator – Phase Difference Measurement using Synchroscope –Tri- vector Meter – Merz Price Maximum Demand Indicator. Frequency Measurement Frequency Meter – Digital Frequency Meter (Simplified Block Diagram)	15
IV	MEASUREMENT OF L, C PARAMETERS, WAVEFORMS AND SIGNAL CONDITIONERS Inductance – Maxwell's Inductance Bridge – Anderson's Bridge – Measurement of Capacitance using Schering Bridge. CRO – Block Diagram – CRT – Applications - Measurements of Voltage, Frequency and Phase Difference Using CRO – Digital Storage Oscilloscope – Block Diagram. SIGNAL CONDITIONER: Basic Components of Signal Conditioning System	13
V	 SENSORS AND TRANSDUCERS Definition – Types of Transducers PASSIVE TRANSDUCERS: Resistive Transducer – Strain Gauge – Capacitive Transducer – Inductive Transducer – Proximity Sensor – Construction and Operation of LVDT and RVDT ACTIVE TRANSDUCERS: RTD – Thermistor - Thermocouple – Synchronous – Piezoelectric Transducer-Measurement of Pressure and Vibration – Hall Effect Transducer – Photovoltaic Transducer – Photoconductive Transducer. 	15

TEXT BOOK:

S.No	Name of the Book	Author	Publisher
1.	A Course in Electrical and Electronics Measurements and Instrumentation	A.K. Sawhney	Puneet Sawhney Dhanpat Rai & Co (P) Ltd., New Delhi 1993

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1.	Electronic Instrumentation	HS Kalsi	Tata Mc Graw Hill Publishing Co., Delhi 2010
2.	Modern Electronic Instrumentation and Measurement techniques	Albert D. Helfrick William David Cooper	Prentice – Hall of India (P) Ltd., New Delhi 2010
3.	Electronics and Instrumentation	Dr.S.K.Bhattacharya Dr. Renu Vig	S.K. Kataria & Sons, New Delhi
4.	A course in Electrical and Electronic Measurement and Instrumentation	Umesh Sinha	Satya Prakashan, New Delhi

: Diploma in Electrical and Electronics Engineering

: 4030430

: IV

Semester Subject Title

Course Name

Subject Code

: ANALOG AND DIGITAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions			Examinati	on	
4030430	Houng	Hound /		Marks		
ANALOG AND	/ Week	Semester	Internal	Board	Total	Duration
DIGITAL	/ // 0011	Semester	Assessment	Examinations	Iotui	Durumon
ELECTRONICS	4	64	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Unit No	Topics	Hours
Ι	Linear ICs and OP-amps	10
II	A/D, D/A, Special Function ICs and IC Voltage Regulators	13
III	Boolean Algebra and Arithmetic operations	10
IV	Combinational and Sequential Logic Circuits	12
V	Memories	12
	Tests and Model Exam	07
	64	

Topics and Allocation of Hours:

RATIONALE:

The subject Analog and Digital Electronics holds applications in all branches of engineering instrumentation and Industrial Automation. This will impart in depth knowledge of Number Systems, Logics of Combinational & Sequential circuits and memories.

OBJECTIVES:

On completion of the following units of the syllabus contents, the students must be able to

- Understand the basics of operational amplifiers.
- Know the op-amp applications.
- Know the waveform generator and Active filter.
- Know the concept of D/A and A/D converters
- Know the applications of Special function IC, IC 555 Timer.
- Understand various Number Systems used in Digital Circuits
- Understand basic Boolean postulates and laws.
- Understand the De-Morgan's theorem.
- Understand the concept of Karnaugh Map.
- Learn about Basic logic Gates.
- Study about Boolean techniques.
- Learn the different digital logic families
- Learn arithmetic circuits- Adder/Subtractor
- Understand the encoder/decoder & MUX / DEMUX
- Understand the concept of parity Generator and checker
- Understand various types of flip-flops.
- Understand various types of counters.
- Understand various modes of shift registers.
- Understand various types of memories.

CONTE	ENTS: Theory	
Unit	Name of the Topics	Time
I	LINEAR ICS AND OP-AMPS 1.1: OPERATIONAL AMPLIFIER Ideal Op-Amp – Block diagram and Characteristics – Op-amp parameters CMRR – Slew rate – Concept of Virtual ground 1.2: APPLICATIONS OF OP-AMP Inverting amplifier –Summing amplifier – Non inverting amplifier – Voltage follower - Comparator – Zero crossing detector – Integrator – Differentiator-waveform generation (Schmitt Trigger only)–RC Low pass Active filter. 1.3: OP-AMP SPECIFICATIONS OP-amp 741 – Symbol – Pin diagram – Specifications	12
II	 A/D, D/A, SPECIAL FUNCTION ICs AND IC VOLTAGE REGULATORS 2.1: SAMPLING AND QUANTIZATION 2.2: A/D CONVERTER Analog to digital conversion using Ramp method – Successive approximation method – Dual slope method – Specifications of A/D converter 2.3: D/A CONVERTER Basic concepts – Weighted Resistor D/A converter – R-2R Ladder D/A converter – Specifications of DAC IC 2.4: SPECIAL FUNCTION ICs 2.4.1: IC 555 Timer – Pin diagram - Functional Block diagram of IC 555 in A stable and Mono stable Multi-vibrator mode - Schmitt trigger using IC 555 2.4.2: IC 565-PLL-Pin Diagram-Functional Block diagram of IC 565 2.4.3: IC 566-VCO-Pin Diagram-Functional Block diagram of IC 566 2.5: IC VOLTAGE REGULATORS Positive IC Voltage Regulators: 78XX - Negative IC Voltage Regulators: 79XX and General-nurpose IC Voltage Regulators using I M 723 	13
III	 BOOLEAN ALGEBRA AND ARITHMETIC OPERATIONS 3.1: NUMBER SYSTEMS Decimal – Binary – Octal – Hexadecimal – BCD – Conversion from one number system to other – Boolean Algebra – Basic laws and Demorgan's Theorems 3.2: UNIVERSAL GATES Realization of basic logic gates using universal gates NAND and NOR -Tristate Buffer circuit 3.3: PROBLEMS USING 2, 3, AND 4 VARIABLES Boolean expression for outputs – Simplification of Boolean expression using Karnaugh map (up to 4 variable)- Constructing logic circuits for the Boolean expressions 3.4: ARITHMETIC OPERATIONS Binary Addition-Binary Subtraction-1's compliment and 2's complement-Signed binary numbers 3.5: ARITHMETIC CIRCUITS Half Adder-Full Adder-Half Subtractor-Full Subtractor 	10
IV	COMBINATIONAL AND SEQUENTIAL LOGIC CIRCUITS 4.1: PARITY GENERATOR AND CHECKER 4.2: DECIMAL to BCD ENCODER 4.3: 3 to 8 DECODER	12

	4.4: MULTIPLEXER : 4 to 1 Multiplexer						
	4.5: DEMULTIPLEXER :1 to 4 Demultiplexer						
	4.6: FLIP-FLOPS (FF)						
	RS FF– JK FF: Master Slave FF and Edge triggered FF – D and T FF						
	4.7: COUNTERS						
	4 bit Asynchronous Up Counter – Mod N counter – Decade counter –						
	4 bit Synchronous up counter						
	4.8:SHIFT REGISTER						
	4 bit shift register – Serial in Serial out						
	MEMORIES						
	5.1: CLASSIFICATION OF MEMORIES						
V	5.2:RAM						
v	RAM organization-Address Lines and Memory Size- Read/write operations-Static RAM-	10					
	Bipolar RAM cell- Dynamic RAM- SD RAM- DDR RAM.	12					
	5.3:ROM						
	ROM organization-Expanding memory- PROM- EPROM- and EEPROM- Flash memory-						
	Anti Fuse Technologies.						

TEXT BOOK:

S.No	Name of the Book	Author	Publisher
1.	Digital Electronics	Roger L. Tokheim Macmillan	McGraw – Hill –1994.
2.	Linear Integrated Circuits	D.Roychoudhury & shail. B.Jain	New age International publishers - II Edition -2004

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1	Digital Principles and Applications	Albert Paul Malvino and Donold P. Leach	
2	Digital Electronics	William H.Goth Mann	An introduction to theory and practice – PHI 1998.
3	Linear Integrated Circuits	B.Suseela & T.R.Ganesh babu	Scitech publications-2018
4	Integrated circuits	K.R.Botkar	Khanna publishers-1996
5	Modern Digital Electronics	R.P.Jain	TMH 2003

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030440
Semester	: IV
Subject Title	: E - VEHICLE TECHNOLOGY & POLICY

TEACHING AND SCHEME OF EXAMINATION

				No of weel	ks per se	mester: 16 week
Subject	Examination					
4030440	Houng	Houns /	Marks			
E - VEHICLE		Hours /	Internal	Board	Total	Duration
TECHNOLOGY &	/ WEEK	Semester	Assessment	Examinations	Total	
POLICY	4	64	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result.

Unit No	Topics	Hours			
Ι	Environmental impact and history& Electric vehicle Types	12			
II	Electric vehicle & Drive System	12			
III	Energy Storages, Charging System, Effects and Impacts	12			
IV	Electric Mobility Policy Framework India	11			
V	E-Vehicle Policy 2019	10			
	Tests and Model Exam	07			
	Total 64				

Topics and Allocation of Hours:

RATIONALE

The world is transitioning to cleaner mobility options with the aim at improving air quality and reducing dependency on fossil fuels. Electric Vehicles (EVs) have emerged as a popular clean mobility choice to reduce emissions. EVs are powered fully or partially by batteries, they can help to reduce dependence on fossil fuels and also air quality. Puducherry is one of the most advanced states in India. Puducherry has a highly developed industrial eco-system and is very strong in sectors like automobiles and auto-components. Many globally renowned companies have set up their manufacturing facilities in Puducherry. Due to the rapid depletion of fossil fuel and increase in fuel cost, environmental pollution, the shift to clean transport is necessary. This subject is introduced by keeping all the above factors.

OBJECTIVES

- To learn the environmental impact and history of Electric Vehicles.
- To understand the concept of Electric Vehicle and its types.
- To study the configurations of Electric Vehicles
- To acquire knowledge about Energy Storages, Charging System, Effects and Impacts
- To appreciate the Electric Mobility Policy Framework India and EV Policy Puducherry2019.

DETAILED SYLLABUS

CONTENTS: Theory

Unit	Name of the Topics	Time
	Environmental impact and history & Electric vehicle Types:	
	Environmental impact and history: Air pollution – Petroleum resources – History of Electric	
Ι	vehicles - History of Hybrid Electric Vehicles - History of Fuel Cell Vehicles - Hybrid electric	12
	Vehicle (HEV) - Plug-in Hybrid Electric Vehicle (PHEV) - Battery Electric Vehicle (BEV) -	
	Fuel Cell Electric Vehicle (FCEV) – Description.	
II	Electric vehicle & Drive System:	15

	El de Ville Confirme d'El de Ville Defense de El de Ville							
	Electric venicles: Configurations of Electric venicle – Performance of Electric venicles–							
	I ractive Effort in Normal Driving – Energy							
	Consumption. Hybrid Electric Vehicles: Concept of Hybrid Electric Drive							
	Trains – Architecture of Hybrid Electric Drive Trains. Electric Propulsion Systems: Drive							
	Systems: DC Motor Drives - Principle of Operation – Induction Motor Drives - Basic Operation							
	Principles – Permanent Magnetic Brushless DC Motor Drives – Principles – Construction and							
	Classification.							
	Energy Storages, Charging System, Effects and Impacts:							
	Energy Storages: Electrochemical Batteries – Battery Technologies – Lead Acid Batteries –							
III	Nickel Based Batteries – Lithium Based Batteries – Charging system –DC charging – Wireless	^{ss} 12						
	charging – Power conversion techniques.							
	Effects of EV – Impacts on Power grid – Impacts on Environment – Impacts on Economy.							
	Electric Mobility Policy Framework India:							
	Government of India Electric Mobility Policy FrameWork – Global Scenario of EV Adoption							
IV	– Electric Mobility in India – National Electric Mobility Mission Plan 2020 – Action led by							
- '	Original Equipment Manufacturers – Key Performance Indicator - Global Impact – Trends and	11						
	Future Developments	u						
	F Vehicle Deliev 2010.							
	E-venicie Foncy 2019:							
	E-venicle Policy 2019: Venicle Population in Puducherry – Need of EV Policy – Advantage of							
V	EV Eco system – Scope and Applicability of EV Policy – Objectives of EV Policy – Policy							
	Measures – Demand Side Incentives – Supply Side Incentives to promote EV.							
	Manufacturing – Revision of Transport Regulation of EV – City Building Codes – Capacity							
	Building and Skilling – Charging Structure – Implementing Agencies – R&D and Business							
	Incubation – Recycling Ecosystem – Battery and EVs.							

TEXT BOOKS:

1. Modern Electric, Hybrid Electric and Fuel Cell Vehicles, Mehrdad Ehsani, Yimin Gao, Sebastien E.Gay, Ali Emadi, CR Press, London, New York.

2. Comparison of Electric and Conventional Vehicles in Indian Market: Total Cost of Ownership, Consumer Preference and Best Segment for Electric Vehicle (IJSR), Akshat Bansal, Akriti Agarwal

REFERENCE BOOKS:

1. A Comprehensive Study of Key Electric Vehicle (EV) Components, Technologies, Challenges, Impacts, and Future Direction of Development (MDPI), Fuad Un-Noor, Sanjeevi kumar Padmanaban, Lucian Mihet-Popa, Mohammad Nurunnabi Mollah and Eklas Hossain.

2. Electric Vehicles: A future Projection CII October 2020 report.

3. Design and analysis of aluminum/air battery system for electric vehicles, Shaohua Yang, Harold Knickle, Elsevier.

4. Propelling Electric Vehicles in India, Technical study of Electric Vehicles and Charging Infrastructure

5. Zero Emission Vehicles (Zevs): Towards A Policy Framework – Niti Aayog.

6. Faster Adoption of Electric Vehicles in India: Perspective of Consumers and Industry, The Energy and Resources Institute, New Delhi.

7. India EV Story: Emerging Opportunities by Innovation Norway.

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030450
Semester	: IV
Subject Title	: Electrical Machines and Instrumentation Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions			Examinat		
	Hauna			Marks		
4030450 Electrical Machines and Instrumentation Practical	/ Week	Hours / Semester	Internal Assessm ent	Board Examinations	Total	Duration
	4	64	60	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

• To impart practical knowledge to the Diploma Students, Practical's are introduced f or every corresponding Theory Subject.

• This Practical Subject supports the Aim and Objective of Electrical Machines II and Measurements and Instruments subjects.

OBJECTIVES:

On completion of this practical Subject the Students will be able to:

- Understand the characteristics of AC Machines.
- Make various Electrical Measurements.
- Use Transducers in Non-Electrical Quantity Measurement

DETAILED SYLLABUS

Contents: Practical

Name of the Topics: Electrical Machines and Instrumentation Practical Exercise:

- 1. Predetermine the Regulation of Alternator.
- 2. Load test on 3 Phase Alternator.
- 3. Synchronization of 3 Phase Alternator
- 4. Load test on Single Phase Induction Motor.
- 5. Load test on 3 Phase Induction Motor.
- 6. Determine the Equivalent Circuit Constants of 3 Phase Induction Motor.
- 7. Predetermine the performance of a 3 Phase Induction Motor.
- 8. Improvement of Power Factor of an Induction Motor with load.
- 9. Calibration of given Ammeter and Voltmeter.
- 10. Calibration of given Wattmeter.
- 11. Calibration of 3 Phase Energy Meter.
- 12. Measurement of Alternator Winding Resistance using Wheatstone Bridge.
- 13. Measurement of value of unknown Capacitance using Schering Bridge.
- 14. Measurement of value of unknown Inductance using Anderson Bridge.
- 15. Displacement measurement using LVDT.
- 16. Measurement of earth Resistance by using Megger.

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S. No	Name of the equipment	Quantity
1	Three Phase Squirrel Cage Induction motor 5 HP, 440V,1440 rpm with starting and	2
1	loading arrangement	2
2	Three Phase Squirrel Cage Induction motor 5 HP,440V,1440 rpm without starting and	1
Δ	loading arrangement	1
2	Three phase Slip ring Induction motor 5HP, 440V, 940/1450 rpm with starting and loading	1
3	arrangement	1
4	Single phase induction motor with starting and loading arrangement 2HP, 250V, 10A,	1
4	1440 rpm	1
5	Wheatstone bridge	2
6	Anderson Bridge.	2
7	Schering Bridge.	2
8	1 Phase Energy meter induction type, 250V, 10A.	2
9	3 Phase Energy meter Induction type 440V, 10/20A.	2
10	Earth megger with necessary connecting leads and rods	1
11	3 phase Alternator with prime mover.	2
12	Synchronizing panel.	1
13	PF meter (power factor meter).	2
14	LVDT trainer.	2
15	3 phase capacitor bank rating of 1KVAR, 400/440 V.	1

DETAILED ALLOCATION OF MARKS

S. No	Name of the activity	Mark
1	CIRCUIT DIAGRAM	30
2	CONNECTIONS AND CONDUCTION OF THE EXPERIMENT	30
3	READING/CALCULATION	20
4	GRAPH/RESULT	15
5	VIVA VOCE	05
	Total	100
: Diploma in Electrical and Electronics Engineering

: 4030460

: IV

Semester Subject Title

Course Name

Subject Code

: ANALOG AND DIGITAL ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

	Subject	Instructions					
	4020460	Hours			Marks	Total	
	ANALOG AND DIGITAL ELECTRONICS PRACTICAL	/ Week	Hours / Semester	Internal Assessm ent	Board Examinations	Total	Duration
		5	80	60	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result.

RATIONALE:

Every Electronic Engineer should have sound knowledge about the ICs used in the Electronics Industry. This is vital in the R & D Department for Chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Analog and Digital Electronics Practical. By doing practical experience in this, they will be skilled in handling all types of ICs and able to apply the skill in electronic system design and the designing of PCBs.

OBJECTIVES:

On completion of the following experiments, the students must be able to

- Know the Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates
- Know the Realization of basic gates using NAND & NOR gates.
- Know the verification of Half Adder and Full Adder using IC's.
- Know the verification of Half Subtractor and Full Subtractor using IC's.
- Know the Verification of Truth Table for Decoder/Encoder.
- Know the Verification of truth table for RS, D, T & JK flip-flop.
- Test Inverting Amplifier and Non inverting amplifier using Op-amp
- Test Summing Amplifier, Difference Amplifier and Voltage Comparator using Op-amp.
- Test Integrator and Differentiator.
- Test A stable multi-vibrator using IC 555
- Design IC Voltage Regulator Power Supplies using IC 7805, IC 7912
- Design the PCB of 4- bit ripple counter using FF

DETAILED SYLLABUS

Contents: Practical

Exercises

Note: At least 6 experiments should be constructed using breadboard

- 1. Realization of basic gates using NAND & NOR gates.
- 2. Realization of logic circuit for De Morgan's Theorems
- 3. Test the performance of Half Adder and Full Adder.
- 4. Test the performance of Half Subtractor and Full Subtractor.
- 5. Test the performance of Decoder/Encoder.
- 6. Test the performance of RS, D, T & JK flip-flops.
- 7. Test the performance of Parity generator and checker using parity checker/generator IC's.
- 8. Test the performance of Multiplexer/Demultiplexer using IC 4051
- 9. Test the performance of Inverting Amplifier and Non inverting amplifier using Op-amp IC 741.

- 10. Test the performance of Summing Amplifier, Difference Amplifier.
- 11. Test the performance of Zero Crossing Detector and Voltage Comparator using Op-amp IC 741.
- 12. Test the performance of Integrator and Differentiator using Op-amp IC 741.
- 13. Test the performance of A stable multi vibrator using IC 555.
- 14. Test the performance of IC Voltage Regulator Power Supplies using IC 7805, IC 7912.
- 15. Design the PCB of 4- bit ripple counter using FF using Software tool Multisim / Or CAD.

S.No	Name of the activity	Mark Allocation
1	CIRCUIT DIAGRAM	25
2	CONNECTION	30
3	EXECUTION & HANDLING OF EQUIPMENT	20
4	OUTPUT/RESULT	15
5	VIVA VOCE	10
	Total	100

DETAILED ALLOCATION OF MARKS

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.No	Name of the equipment	Range	Required Quantity
1	DC Regulated power supply	0-30V,1A	5
2	IC Voltage Power Supply	0-5V,1A 15-0-15V, 1A	5 5
3	Signal Generator	1MHz	4
4	Dual trace CRO	20MHz/30MHz	5
5	Digital Trainer	-	10
6	DC Voltmeter (Analog/Digital)	Different Ranges	5
7	DC Ammeter (Analog/Digital)	Different Ranges	5
8	Desktop Computer	-	5
9	Simulation Tool	Multisim/OrCAD	1

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030470
Semester	: IV
Subject Title	: Electrical Circuits and Simulation Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

	Subject Instructions			Examination				
	4030470 Electrical Circuits and	Houng	Hours /					
		/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration	
	Simulation Practical	4	64	60	100*	100	3Hrs	

*Examinations will be conducted for 100 marks and it will be reduced to 40 marks for result

RATIONALE

All the Engineering applications are simulated through Computers. They are tested and then built using real components for commercial implementation. Simulation Software is available for all Engineering Fields. Hers is an attempt to impart the knowledge of using Simulation Software for realizing some of the Electrical and Electronics Circuits for the Diploma students.

OBJECTIVES

On Completion Of This Practical subject, the Students will be able to know :

- The Various Aspects of Simulation Software
- Simulate and Test the Simple Electrical and Electronics Circuits
- Simulate and Test the Wave Generating Circuits
- Simulate and Prove the Simple Theorems
- Simulate and Test the Performance Characteristics of Converters
- Design and Verify the Results of Various Electric Circuits Using Simulation Software

DETAILED SYLLABUS

Contents: Practical

Name of the Topics: Electrical Circuits and Simulation Practical Exercise

1. Generate the following waveforms

i.Sinusoidal waveform of Fundamental Frequency (50Hz)

ii.3rd Order, 5th Order and 7th Order Harmonics for the Fundamental frequency

- 2. Simulation of RLC series and RLC Parallel Response Circuits.
- 3. Step Response of RL and RC Series Circuit.
- 4. Simulation of Mesh and Nodal analysis for DC Circuits.
- 5. Verification of Superposition Theorem.
- 6. Verification of Thevenin's and Norton's Theorem.
- 7. Verification of Maximum Power Transfer Theorem.
- 8. Simulation of Full Wave Rectifier (Center Tapped and Bridge) with RL load.
- 9. Simulation of Single-Phase Half Wave Controlled Converter with RL Load and Free Wheeling Diode.
- 10. Simulation of Single-Phase Full Wave Controlled Converter with RL Load and Free Wheeling Diode.
- 11. Simulation of Three Phase Star Connected Balanced and Unbalanced Load
- 12. Simulation of Three Phase Delta Connected Balanced and Unbalanced Load
- 13. Simulation of Three Phase Nonlinear Star Connected Load with Three Phase 3 Wire System.
- 14. Simulation of Three Phase Nonlinear Star Connected Load with Three Phase 4 Wire System.

15. Simulation basic Logic Gates, Universal Logic Gates and Realization of Logic Gates using Universal Logic Gates.

16. Simulation of Half Adders and Full Adder.

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.No	Name of the equipment	Required Quantity
1	PC with any suitable simulation software	30
2	UPS 5KVA with half an hour battery backup	1
3	Printer	1

S.No	Name of the activity	Mark Allocation
1	CIRCUIT DIAGRAM (MANUAL DIARGAM)	30
2	DEVELOPMENT OF CIRCUIT DIAGRAM	30
3	SIMULATION PERFORMANCE & PRINT OUT	35
5	VIVA VOCE	05
	Total	100

DETAILED ALLOCATION OF MARKS

SEMESTER - V

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030510
Semester	: V
Subject Title	: GENERATION, TRANSMISSION AND SWITCHGEAR

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

	Subject	Instru	ctions	s Examination			
	4030510	Haung	Houng /		Marks		
G	ENERATION,	/ Wook	Nours / Somostor	Internal	Board	Total	Duration
TF	RANSMISSION	/ WEEK	Semester	Assessment	Examinations	Total	Duration
ANI	O SWITCHGEAR	5	80	40	100*	100	3Hrs

*Examinations will be conducted for 100 marks and it will be reduced to 60 marks for result

	Topics and Anotation of Hours.						
Unit No	Topics	Hours					
Ι	Generation of Electrical Power	16					
II	A.C. And H.V.D.C Transmission	14					
III	FACTS, Line Insulators and Underground Cables	14					
IV	Circuit Breakers and Over Voltage Protection	14					
V	Protective Relays and Grounding	15					
Test and Model Exam 7							
	Total 80						

Topics and Allocation of Hours:

RATIONALE

Energy is the basic necessity for the Economic Development of a Country and also there is a growing impulse towards green and reduction in the use of Fossil Fuels. As a matter of fact, there is a close relationship between the Energy used per person and his standard of living. The Modern Society is so much dependent upon the use of Electrical Energy that it has become a part of our life. So, to have adequate knowledge in Electrical Power Generation and Transmission, Switchgear and efficiency associated with them, it becomes necessary to include this subject.

OBJECTIVES

To Understand

- Conventional Power Plants-Layout and choice of site
- Renewable Energy Sources and Power Generation
- A.C Transmission-Supports, Conductors, Effects, Regulation and Efficiency
- H.V.D.C Transmission
- FACTS, Line Insulators and Underground Cables
- Circuit Breakers, Protective Relay and Lightning Arresters

Contents: Theory					
UNIT	NAME OF THE TOPICS	HOURS			
	GENERATION OF ELECTRICAL POWER				
	Introduction- Conventional methods of power generations – schematic arrangement and				
	choice of site for Hydro, Thermal, Nuclear power plants Advantages and Disadvantages-				
Ι	comparison of these power plants - Principle and types of co-generation.	16			
	Schematic arrangement of Diesel, Gas, Pumped storage schemes Advantages and				
	Disadvantages-Grid or Inter connected system-Advantages of Inter connected systems-				
	Load Transfer through Inter connector-Load curves and Load duration curves-connected				

	load-Average load-Maximum Demand Factor- Plant capacity factor-Load factor and its	
	significance Diversity factor-Simple problems- Load sharing between base load and peak	
	load plants.	
	Renewable Energy sources- Basic principle of Solar Energy, Wind Power Generation-	
	Hybrid Renewable Energy Systems.	
	H.V.D.C Transmission:	
п	Advantages and Disadvantages of D.C Transmission- Layout Scheme and principle of	14
11	High Voltage D.C Transmission-D.C link configurations (Monopolar, Bipolar and	14
	Homopolar)-HVDC convertor Station (Schematic diagram only).	
	FACTS, LINE INSULATORS AND UNDERGROUND CABLES:	
	Definition-Need for FACTS controllers- types of FACTS controllers - STATCOM-UPFC	
	(block diagram explanation only)	
	Line Insulators:	
	Introduction - Line Insulator Materials-Properties of Insulators- Types & causes of failure	
	of Insulators-Testing of Insulators-Potential Distribution over suspension Insulator String-	
Ш	String Efficiency - Methods of improving string efficiency- problems.	14
	Underground cables:	
	Introduction-Advantages and requirement of cables-construction of a three core cable-	
	Insulating materials for cables- properties of Insulating materials used in cables-	
	classification of cables- cables for three phase service construction of Belted cable	
	screened cable, pressure cables-Laving of underground cables-Direct laving. Drawing	
	system. Advantages and Disadvantages.	
	CIRCUIT BREAKERS AND OVER VOLTAGE PROTECTION	
	Switchgear-Essential features of Switchgear-faults in a Power system (definition only).	
	CIRCUIT BREAKERS:	
	Basic principle of circuit Breaker -Arc Phenomenon- methods of Arc Extinction-Arc	
	voltage – Re-striking voltage and recovery voltage-Rate of rise of restriking voltage C.B	
	ratings – Breaking capacity, making capacity, short time rating - Auto reclosing in circuit	
	Breakers - Classification of Circuit Breakers – Construction and Working principle of Air	
	Circuit Breakers, E.L.C.B, Residual current circuit breaker SF6 and vacuum Circuit	
IV	Breaker Maintenance of Circuit Breakers – Rupturing capacity of circuit breaker	14
	conditions to trip – Auto reclose breaker – Fault clearance time – Inverse time overload	
	relay – Maintenance Requirement for oil circuit breakers – SF6 Circuit Breakers.	
	FUSES- L.V fuses- Rewirable fuse, HRC fuse-H.V. fuses & Cartridge Type, Liquid Type	
	and Metal Clad-Fuses.	
	OVER VOLTAGE PROTECTION:	
	Voltage surge- causes of over voltage-Lightning-Types of lightning strokes - Direct stroke,	
	indirect stroke-Harmful Effects of lightning Protection against lightning- Earthing screen,	
	overhead ground Wires, Lightning arresters Expulsion type, Gapless arrester	
	PROTECTIVE RELAYS AND GROUNDING	
	PROTECTIVE RELAYS:	
	Basic principle-Fundamental requirements of protective relaying- Primary and back up	
	Protection-relay characteristics-relay timing - Instantaneous relay - Inverse time relay and	
	Definite time lag relay- Inverse definite minimum time relay -classification of relays-	
	Construction. Principle of operation and applications of Induction type over current relay	
V	(Directional and Non-directional). Differential relay. Static relays- Basic elements of static	15
	relay-Over Current-Distance relay (Block diagram explanation only).	
	GROUNDING:	
	Introduction-Equipment grounding- system grounding- ungrounded neutral system-	
	Necessity of Neutral is grounding – Methods- solid grounding Resistance grounding	
	Reactance grounding, and resonant grounding.	
1		1

TEXT BOOK

Sl. No	Name of the Book	Author	Publisher	Edition
1	Principles of Power	V V Matha	S.Chand & Company,	4 th Edition
	System	V.K.Metha	NewDelhi	Reprint 2007

REFERENCE BOOK

Sl.No	Name of the Book	Author	Publisher	Edition	
1	Electrical Bower System	CI Wadhwa	New Age International,	Fourth	
1	Electrical Power System	CL wadnwa	New Delhi	Edition, 2009	
2	A Course in Flootrical Power	Soni Cunta	Dhanpat Rai Co (P) Ltd,		
Δ	A Course in Electrical Fower	Som, Oupta	New Delhi		
3	Electrical Power	S.L Uppal	Khanna Delhi Publishers		
4	A Course in Electrical Power	J.B. Gupta	Kaison Publishing House	Reprint 2004	
5	HVDC Power Transmission	KD Dadiwar	New Age International,	Reprint 2005	
5	System & Technology	KK. Faulyai	New Delhi	Keprint 2003	
	Digital Protection – Protective			Second	
6	Relaying from Electromechanical	LP Singh	New Age International	Edition 1997	
	to Microprocessor				
7	Power System Protection and	B Ram & DN	TMH 1005	Penrint 2000	
/	Switchgear	Viswakarma	11/11/1995	Keprint 2000	
	Thyristor-Based Facts Controllers	Mohan	IFFE pross and John		
8	for Electrical Transmission	Mathur.R., Rajiv.	Wiley & Sons Inc. Now	2005	
	Systems	K.Varma	whey & Sons, me., New		
	Understanding FACTS - Concepts	Narain G.	Standarda publishara Navy		
9	and Technology of Flexible AC	Hingorani,	Dolbi	2001	
	Transmission Systems	Laszio. Gyugyi	Dellil		

Course Name	: Diploma in Engineering and Technology
Subject Code	: 4030520
Semester	: V
Subject Title	: MICROCONTROLLER AND ITS APPLICATIONS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject Instructions		Examination				
4030520	Hanna	Houng /	Marks			
MICROCONTROL	HOUIS	Hours /	Internal	Board	Total	Duration
LER AND ITS	/ Week	Semester	Assessment	Examinations	Total	
APPLICATIONS	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks. Topics and Allocation of Hours

Unit No	Topics	Hours
Ι	Architecture of 8051 Microcontroller	15
II	8051 Instruction set and Programming	16
III	Peripherals of 8051	15
IV	Interfacing techniques	16
V	Advanced Microcontrollers	11
	Test and Model Exam	7
	Total	80

RATIONALE:

The introduction of this subject will enable the students to learn about microcontroller 8051 architecture, Pin details, Instruction sets, Programming and interfacing. This subject enables the students to do the project effectively. It also helps the students to choose the field of interest. If the student is aiming for higher studies, this subject is foundation.

OBJECTIVES:

On completion of the syllabus, the students must be able to

- Know the difference between microprocessor and microcontroller.
- Understand the architecture of 8051.
- Write programs using 8051 ALP.
- Understand the programming of I/O ports, Timer, Interrupt and Serial Programming.
- Use the interfacing techniques
- Know the types of microcontrollers
- Explain IoT

Contents: Theory

UNIT	NAME OF THE TOPICS	HOURS
	Architecture Of 8051 Microcontroller	
	1.1: Architecture	
	Microprocessor-Microcontroller-Comparison of microprocessor and microcontroller-	
т	Architecture diagram of microcontroller 8051-Functions of each block-Pin details of 8051-	15
	ALU- ROM-RAM-Memory organization of 8051- Special function registers-Program	15
	counter-PSW register-Stack-I/O ports-Timer-Interrupt-serial port-External memory-	
	Oscillator and Clock Reset-Power on reset-Clock cycle-machine cycle-Instruction cycle	
	Overview of 8051 family	

	8051 Instruction set and programming		
II	2.1: Instruction Set Of 8051		
	Instruction set of 8051-Classification of 8051 instructions-data transfer instructions -		
	Arithmetic Instructions-Logical Instructions-Branching Instructions-Bit manipulation	16	
	Instructions- Assembling and running an 8051 program-Structure of Assembly Language-	10	
	Assembler Directives Different Addressing modes of 8051-11me delay routines.		
	2.2: Assembly language programs		
	10-bit addition and 16-bit subtraction-8-bit multiplication and 8 bit division BCD to HEX		
	Code conversion-HEA to BCD code conversionSmanest number/ Biggest number.		
	Peripherals of 8051 2.1. I/O Dente Dit addresses for I/O ports I/O port programming I/O hit manipulation		
	5.1: I/O Ports Bit addresses for I/O ports-I/O port programming-I/O bit manipulation		
	programming.		
TTT	SEDS for Timer Modes of Timers (counters, Drogramming 2051 Timer (Simple grograms)		
111	15 3 a Social Communication		
	5.5: Serial Communication Design of again provided and 9051	rd-8051	
	Basics of serial communication-SFKs for serial communication-KS252 standard-8051		
	connection to RS 232-8051 serial port programming.		
	3.4: Interrupts 8051 interrupts-SFRs for interrupt-interrupt priority.		
	Interfacing Leconiques		
	4.1: IC 8255 IC 8255-Block Diagram-Modes of 8255-8051 interfacing with 8255		
IV	4.2: Interfacing	16	
	Interfacing external memory to 8051-Relay interfacing- Sensor interfacing - Seven segments		
	LED display interfacing-Keyboard Interfacing-Stepper motor interfacing-ADC interfacing-		
	DAC interfacing-DC motor interfacing using PWM-LCD interfacing.		
	Advanced Microcontrollers		
	5.1: Types of microcontrollers		
V	PIC microcontroller-General Block diagram-Features-Applications Arduino- General		
	Block diagram-Variants-Features-Applications Raspberry pi-General Block diagram-	11	
	Features-Applications-Comparison of microcontrollers.		
	5.2: IoT Introduction to IoT-Block diagram of home automation using IoT.		
' I' I' I' I			

"Ajit pal" "Microcontrollers, Principles and Applications ",PHI Ltd,-2011. 1.

"Mazidi, Mazidi and D.MacKinlay" "8051 Microcontroller and Embedded Systems using Assembly and 2. C",2006 Pearson Education Low Price Edition.

REFERENCE BOOKS

- "R. Theagarajan" "Microprocessor and Microcontroller", Sci Tech Publication, Chennai. 1.
- www.microchip.com, www.raspberrypi.org, www.arduino.org. 2.
- "J.B. Peatman" "Design with PIC microcontrollers". 3.
- "Michael McRoberts", "Beginning Arduino. 4.
- "Matt Richardson","Getting started with Raspberry Pi". 6. 8."Samuel Greengard","The Internet of Things". 5.

: Diploma in	Electrical and Electronics Engineering
: 4030531	
: V	

: CONTROL OF ELECTRICAL MACHINES TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination			
4030531	1 LOF Hours	Houng /	Marks			
CONTROL OF		Hours Hours / / Week Semester	Internal	Board	Total	Duration
ELECTRICAL	/ WEEK	Semester	Assessment	Examinations	Total	
MACHINES	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Unit No	Topics	Hours
Ι	Control Circuit Components	16
II	Motor Control Circuits	15
III	Industrial Control Circuits	14
IV	Programmable Logic Controller	14
V	PLC Programming and SCADA	14
	Test and Model Exam	
	Total	80

Topics and Allocation of Hours

RATIONALE

Course Name Subject Code Semester

Subject Title

The Energy Conversion between Electrical and Mechanical Systems is performed by the Control of Electrical Machines in both directions. Various Control Operations are to be performed on the Electrical Machines to meet the Industrial requirements. Especially Technicians are mainly employed to look after the control Panels. To make our students Employable, they have to be trained in using various Control Components and Circuits. This subject fulfills the requirement.

OBJECTIVES

Contents: Theory

At the end of the Semester the Students must be able to understand the concepts of:

1. Electrical Control Circuit Elements including Various Types of Industrial Switches, Relays, Timers, Solenoids, Contactors and Interlocking arrangements.

2. DC Motor and AC Motor Control Circuits for Acceleration Control, Speed Control, Direction Control, Braking Control and jogging using Contactors.

- 3. Different Control Circuits for Industrial Applications.
- 4. Basics of Programmable Logic Controllers.
- 5. PLC Programming and SCADA

Unit	Name of the Topics	Hours
	CONTROL CIRCUIT COMPONENTS	
	Switches – Push Button, Selector, Drum, Limit, Pressure, Temperature (Thermostat), Float,	
	Zero Speed and Proximity Switches. Relays - Voltage Relay, DC Series Current Relay,	
	Frequency Response Relay, Latching Relay and Phase Failure Relay (Single Phasing	
Ι	Preventer). Over Current Relay – Bimetallic Thermal Over Load Relay and Magnetic	16
	DashPot Oil Filled Relay.	
	Timer – Thermal Pneumatic and Electronic Timer. Solenoid Valve, Solenoid Type Contactor	
	(Air Break Contactor), Solid State Relay, Simple ON-OFF Motor Control Circuit, Remote	
	Control Operation and Interlocking of Drives.	
II	MOTOR CONTROL CIRCUITS	15

	CHAPTER: 2.1: DC MOTOR CONTROL CIRCUITS		
	Series Relay and Counter EMF Starters – Field Failure Protection – Jogging Control,		
	Dynamic Braking		
	CHAPTER: 2.2:AC MOTOR CONTROL CIRCUITS		
	DOL Starter - Automatic Auto Transformer Starter (Open Circuit and Closed-Circuit		
	Transition) - Star/Delta Starter (Semi-Automatic and Automatic) - Starter for Two Speed		
	Two Winding Motor – Reversing the Direction of Rotation of Induction Motor – Dynamic		
	Braking – Three Step Rotor Resistance Starter for Wound Induction Motor – Secondary		
	Frequency Acceleration Starter.		
	INDUSTRIAL CONTROL CIRCUITS		
	Planner Machine Control - Skip Hoist Control - Automatic Control of a Water Pump -		
III	Control of Electric Oven - Control of Air Compressor - Control of Overhead Crane - Control	14	
	of Battery-Operated Truck - Control of Conveyor System - Control of Elevator - Trouble		
	Spots in Control Circuits – General Procedure for Troubleshooting.		
	PROGRAMMABLE LOGIC CONTROLLER		
	Automation – Types of Automation (Manufacturing and Non-Manufacturing) – Advantages		
	of Automation –PLC Introduction – Block Diagram of PLC–Principle of Operation–Modes		
IV	of Operation- PLC Scan-Memory Organization-Input Module (Schematic and Wiring	1/	
1 V	Diagram) – Output Module (Schematic and Wiring Diagram).	14	
	Types of Programming Devices – Comparison between Hardwired Control System and PLC		
	System -PLC Types (Fixed and Modular) - Input Types -Output Types - Criteria for		
	Selection of Suitable PLC – List of Various PLCs available.		
	PLC PROGRAMMING AND SCADA		
	Different Programming Languages – Ladder Diagram – Relay Type Instruction – Timer		
	Instruction - ON Delay and OFF Delay Timer - Retentive Timer Instruction - Cascading		
N/	Timers - Counter Instruction UP Counter - Down Counter - UP/DOWN Counter - Ladder	14	
v	Logic Diagram for DOL Starter, Automatic STAR-DELTA Starter - Rotor Resistance Starter	14	
	and EB to Generator Change over System. Supervisory Control Data Acquisition System		
	(SCADA) – Block Diagram of SCADA, Features and Functions of SCADA – Introduction		
	to DCS.		

TEXT BOOKS:

"S.K.Bhattacharya" "Control of Electrical Machines", New Age International Publishers, New Delhi 1. **REFERENCE BOOKS:**

- "Pradeep Kumar, Srivastava" Exposing Programmable Logic Controllers with Application", 1. **BPB** Publications
- 2.
- "Stephen Herman" Industrial Motor Control", 6 th Edition, Cengage Learning "David Bailey, Edwin Wright" "Practical SCADA for Industry", Newnes Publishers. 3.

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030532
Semester	: V
Subject Title	: PROGRAMMABLE LOGIC CONTROLLERS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
4030532	Hound	Hours /		Marks		
PROGRAMMABLE LOGIC		Hours /	Internal	Board	Total	Duration
	/ WEEK	Semester	Assessment	Examinations	Total	
CONTROLLER	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Unit No	Topics	Hours			
Ι	Introduction to PLC	16			
II	Input / Output Modules	15			
III	PLC Programming	14			
IV	Networking	14			
V	Data Acquisition Systems	14			
	Test and Model Exam 7				
	Total 80				

Topics and Allocation of Hours

RATIONALE

Various control operations are to be performed automatically and sequentially on the electrical machines to suit the industrial requirements. Programmable controllers are mainly employed to control the process in industries. In order to impart knowledge on programmable Logic Controller this theory subject is introduced.

OBJECTIVES

Unit: 1

After completing this chapter, students should able to:

- \checkmark Explain the meaning of automation and List the types of automation
- \checkmark Define PLC and Explain why their use is valuable
- \checkmark Explain what PLC can do
- \checkmark Compare fixed and modular PLC
- \checkmark Explain the advantages of PLC
- \checkmark Explain the functions of various elements of power supply unit.

Unit: 2

After completing this chapter, students should able to:

- \checkmark Know the difference between digital and analog input and output signals
- \checkmark Observe how digital field device information gets into a PLC
- \checkmark Observe how analog field device information gets into a PLC
- \checkmark Understand I/O addresses and how they are used in a PLC

Unit: 3

After completing this chapter, students should able to:

- ✓ Describe PLC timer instruction and differentiate between a non-retentive and retentive timer
- \checkmark Program the control of outputs using the timer instruction

- \checkmark List and describe the functions of PLC counter instructions
- \checkmark Create PLC programs involving program control instructions, math instructions

Unit: 4

After completing this chapter, students should able to:

- \checkmark Explain the functionality of different levels of industrial network
- \checkmark Explain the concept of network topology and network protocols
- \checkmark Explain the concept of I/O bus networks etc.

Unit: 5

After completing this chapter, students should able to:

- \checkmark Describe the computer control of process
- \checkmark Explain the operation of SCADA
- \checkmark Explain the functions of the major components of a process control system
- ✓ Explain how on/off control and PID control work.

Contents	: Theory	
Unit	Name of the Topic	Hours
I	INTRODUCTION TO PLC: Automation – Types of Automation (Manufacturing and Non-Manufacturing) – Advantages of Automation - PLC Introduction - Definition – Block diagram of PLC – Principle of Operation –Modes of Operating System – PLC Scan - Hardwire Control System compared with PLC System - Advantages and Disadvantages of PLCs. Criteria for selection of suitable PLC –Memory Organization – Input Types – Discrete input – Analog in/out - Elements of Power Supply Unit - PLC Types (Fixed I/O and Modular I/O) - List of various PLCs available –Applications of PLC.	16
II	INPUT/OUTPUT MODULES The I/O Section - Discrete I/O Modules (DC and AC) – Analog I/O Modules - Special I/O Modules– I/O Module Specification - Typical Discrete and Analog I/O field Devices – Sensors – Limit Switch– Reed Switch – Proximity Sensor (Inductive and Capacitive). Types of Photo Electric Sensor - Sinking and Sourcing I/O Modules– TTL Output Module – Relay Output Module –Isolated Output Module –Input /Output Addressing Scheme in important commercial PLCs.	15
ш	PLC PROGRAMMINGTypes of Programming Methods – Types of Programming Devices – Logic Functions – AND Logic – OR Logic – NOT Logic - Relay Type instructions – Timer Instructions – ON Delay and OFF Delay Timer.Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter – DOWN Counter – UP/DOWN Counter – Cascading Counters – Program Control Instructions – Data Manipulation Instruction – Data Compare Instructions – Math Instructions - Sequencer Instructions - PID Instruction – PWM Function – Simple programs using above instructions. Develop ladder logic for: Bottle Filling System – Automatic Car Parking System - EB To Generator Changeover System – Batch Process – Elevator System -DOL Starter- Automatic Star-Delta Starter – Traffic Light Control	9
IV	NETWORKING Levels of Industrial Network – Network Topology –Network Protocol – OSI Reference Model - Networking with TCP / IP Protocol - I/O Bus networks – Block diagram of I/O Bus networks – Types of I/O Bus networks.	14

	Protocol standards – Advantages of I/O Bus networks - Gateway – Token passing – Data	
	Highway - Serial Communication - Devicenet - Control Net - Ethernet - Modbus -	
	Fieldbus – Profibus- Sub Netting – Subnet mask - File transfer protocol	
	DATA ACQUISITION SYSTEMS	
	Computers in Process Control - Types of Processes - Structure of Control system -	
V	ON/OFF Control - Closed loop Control - PID Control - Motion Control -Block diagram	14
v	of Direct Digital Control. Supervisory Control and Data Acquisition (SCADA)-Block	14
	diagram of SCADA - Features of SCADA - Functions of SCADA - SCADA software -	
	Data Loggers – Tags – Alarms - landlines for SCADA – use of modems in SCADA.	

TEXT BOOK

Sl. No	Name of the Book	Author	Publisher	Edition
1	Introduction to Programmable Logic Controllers	Gary Dunning	Cengage Learning India PvtLtd – Third Edition 2011	
2	Technician's Guide to Programmable Logic Controllers	Richard A. Cox	Delmer – Sixth Edition 2011	
3	Programmable Logic Controllers – Principle and Applications	John W. Webb	Prentice Hall	
4	ProgrammableLogicControllers–ProgrammingMethods and Applications	John R Hackworth and Fredrick D. Hackworth	Pearson Education	
5	Programmable Logic Controllers	W. Bolton	Newness	
6	Programmable Controller Theory and Implementation	L.A.Bryan E.A.Bryan	An Industrial Text Company Publication – Second Edition 1997	

REFERENCE BOOKS:

Sl. No	Name of the Book	Author	Publisher	Edition
1	Programmable Logic Controllers	Frank D.Petruzella	Tata McGraw Hill Edition-Fourth Edition 2011	
2	Practical SCADA for industry	David Bailey Edwin Wright	Newnes	

: Diploma in Electrical and Electronics Engineering : 4030533 : V

Course Name Subject Code Semester Subject Title

: RENEWABLE ENERGY SOURCE

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination			
4030533	Hours	Hours /		Marks		
RENEWABL	HOULS	nours /	Internal	Board	Total	Duration
E ENERGY	/ week	Semester	Assessment	Examinations	Total	
SOURCE	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Topics and Allocation of Hours

Unit No	Topics	Hours		
Ι	Fundamentals of Energy Systems and Solar Radiation	16		
II	Solar Thermal Conversion and Solar PV Systems	15		
III	Wind, Tidal and Wave Energy	14		
IV	Bio – Energy	14		
V	Geothermal and Oceanic Energy	14		
	Test and Model Exam 7			
	Total 80			

RATIONALE

Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

OBJECTIVES

- Study about the fundamentals of Energy.
- Study the applications of solar energy for thermal and power generation.
- Understand the concept of wind, tidal and wave energies and their applications.
- Understand the Bio energy sources and energy conversion technologies.
- Understand the development of geothermal energy and OTEC principle.

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
Ι	 FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR RADIATION 1.1. FUNDAMENTALS OF ENERGY SYSTEMS: Introduction to Energy - Energy consumption and standard of living - classification of Energy Resources-consumption trend of Primary Energy Resources-importance of Renewable Energy Sources- Energy for Sustainable Development Various Forms of Renewable Energy 1.2 SOLAR RADIATION: Outside Earth's Atmosphere – Earth Surface –Analysis of Solar Radiation Data – Geometry – Measurement of Solar Radiation – Solar Radiation Data in India. 	16
Π	 SOLAR THERMAL CONVERSION AND SOLAR PV SYSTEMS 2.1 SOLAR THERMAL APPLICATIONS: Solar Collectors - Flat Plate Collectors- Concentrating Collectors - Comparison of Collectors - Selection of Collector for Various Applications - Solar Water Heaters 	15

Contents: Theory

	 Solar Industrial Heating System – Solar Cookers - Solar Pond Electric Power Plant. 2.2. SOLAR PV SYSTEMS: A Brief History of PV, PV in Silicon: Basic Principle, Classification of PV Cells - Equivalent Circuit and Electrical Characteristics of Silicon PV Cells – Series Parallel Connections of Solar Cells - Solar PV Array and Solar Panel - Solar Panel Applications - Grid Connected PV System – Stand Alone Solar PV Power Plant – Hybrid Solar PV System. 	
III	 WIND, TIDAL & WAVE ENERGY WIND ENERGY: Introduction-Basic Principles of Wind Energy Conversion: Nature of the Wind, Power in the Wind, Forces on the Blades and Wind Energy Conversion-Wind Data and Energy Estimation-Site Selection-Classification of Wind Energy Conversion Systems - Types of Wind Machines-Horizontal Axis Wind Turbine(HAWT) - Vertical Axis Wind Turbine(VAWT) – Comparison Between HAWT & VAWT - Generating System - Energy Storage – Applications of Wind Energy – Power Generation – Pumping Station -Safety and Environmental Aspects. TIDAL & WAVE ENERGY: Basic Principle of Tidal Power – Components and Operation of Tidal Power Plant – Wave Energy- Wave Energy Conversion Devices. 	14
IV	BIO – ENERGYBIOMASS RESOURCES:Introduction – Photosynthesis – Usable Forms of BioMass, Their Composition andFuel Properties - Biomass Resources.BIOMASS ENERGY CONVERSION:Biomass Conversion Technologies – Urban Waste to Energy Conversion –Biomass Gasification – Biomass Liquification – Biomass to Ethanol Production –Biogas Production from Waste Biomass – Types of Bio Gas Plants - Applications– Biodiesel Production – Biomass Energy Scenario in India.	14
V	GEOTHERMAL AND OCEANIC ENERGYGEO THERMAL ENERGY:Energy inside the Earth – Uses of Geothermal Energy – Geothermal Wells –Potential in India - Types of Geothermal Heat Pump Systems - Types ofGeothermal Power Plants.OCEANIC ENERGY:Ocean Energy Resources – Principle of Ocean Thermal Energy Conversion(OTEC) – Method of Ocean Thermal Electric Power Generation	14

TEXT BOOK

Sl. No	Name of the Book	Author	Publisher	Edition
1	Non-Conventional Energy Sources	G.D. Rai	Khanna Publishers, New Delhi	1999

REFERENCE BOOKS:

Sl. No	Name of the Book	Author	Publisher	Edition
1	Non-Conventional Energy Sources and Utilization	R.K. Rajput	S.Chand & Company Ltd.	2012
2	Renewable Energy Sources	Twidell J.W. and	EFN Spon Ltd.	1986

			Weir A		
3	Non-Conventional Ene Resources	ergy	B.H.Khan	Tata Mc Graw Hill., New Delhi.	2 nd Edn, 2009

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030541
Semester	: V
Subject Title	: CONTROL OF ELECTRICAL MACHINES PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject Instructions		Examination				
4030541	Hours	Hours /				
CONTROL OF		Semeste	Internal	Board	Total	Duration
ELECTRICAL	/ week	r	Assessment	Examinations	Total	
MACHINES	5	80	60	100*	100	2 Urg
PRACTICAL	5	80	00	100*	100	5 1115.

*Examinations will be conducted for 100 marks and it will be reduced to 40 Marks.

RATIONALE

The controlling techniques of various types of AC and DC Electrical Machines are to be practically learned to meet the present industrial requirements. The Controlling Process is mainly to be known as a Diploma Engineer and become a successful Employee or Technician. This Subject will make our students with knowledge of application-oriented skills in Industrially Operated Machines.

OBJECTIVES

On completion of this practical subject the students will be able to:

• Make use of various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and inter locking arrangement.

- Construct various types of automatic starters for electrical motors.
- Construct control circuits for braking, jogging, reversing operations.
- To make use of PLCs for control applications.
- To program PLCs for controlling the motor.

DETAILED SYLLABUS

Contents: Practical

Name of the Topics:

Exercise

- 1. Wire and Test the Control Circuit for Jogging in Cage Induction Motor.
- 2. Wire and Test the Control Circuit for Semi-Automatic Star –Delta Starter.
- 3. Wire and Test the Control Circuit for Automatic Star –Delta Starter.
- 4. Wire and Test the Control Circuit for Dynamic Braking of Cage Motor.
- 5. Wire and Test the Control Circuit for Two Speed Pole Changing Motor.
- 6. Wire and Test the Control Circuit for Forward and Reverse Operation.
- 7. Wire and Test the Control Circuit for Automatic Rotor Resistance Starter.
- 8. Wire and Test the DOL Starter with Single Phase Preventer using PLC.
- 9. Wire and Test the Star Delta Starter using PLC.
- 10. Wire and Test the Control Circuit for Automatic Rotor Resistance Starter using PLC.
- 11. Develop and execute the Ladder Logic Diagram in PLC for 3 Stage Lift Operation.
- 12. Wire and Test the Sequential Operation of Solenoid Valve and a Motor for Tank Filling Operation using PLC.

13. Develop and execute the Ladder Logic to Interface PLC with Conveyor Model for counting the object moving in the Conveyer.

14. Wire and Test the Control Circuit for Jog Forward, Jog Reverse, Forward and Reverse Operations using PLC.

Note: The performance of the control circuit is to be verified with the Induction motor for the experiments 1 to 10.

Sl. No	NAME OF ACTIVITY	MARK ALLOCATION				
1.	Drawing Connection/Ladder Diagram and Writing Details of the Components/Equipment/Machines used	25				
2.	Making the correct circuit connections	20				
3.	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	30				
4.	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	20				
5.	Viva-voce	05				
	Total Marks	100				

DETAILED ALLOCATION OF MARKS

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS

SI. No	LIST OF EQUIPMENT	QUANTITY REQUIRED
1.	Transformer oil Tester Kit, Acidity Test kit	Each 1
2.	Thermal Overload Relay	3
3.	AC Contactor 230v/440v, 16A	26
4.	Push Button With NO/NC Elements	30
5.	Induction Motor 440 V, 1440 rpm, any HP rating (apart from EMII lab)	3
6.	Proximity Switch	2
7.	PLC (any brand) suitable for above experiments	5
8.	Solenoid Valve	2
9.	Three Stage Lift Model, Conveyor Model	Each 1
10.	Forward, Reverse and Jogging (Forward and Reverse) Operation Model	1

Course Name	: Diploma in Electrical and Electronics
Subject Code	: 4030542
Semester	: V Semester
Subject Title	: PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

	Subject Instructions		ictions	Examination			
	4030542 PROGRAMMABL E LOGIC CONTROLLER PRACTICAL	Hours	Hours /		Marks		Duration
		/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration
		5	80	60	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 40 Marks.

RATIONALE

Various control operations are to be performed automatically and sequentially on the electrical machines to suit the industrial requirements. Programmable controllers are mainly employed to control the process in industries. In order to train our students on handling programmable controllers this practical subject is introduced.

OBJECTIVE

On completion of this practical subject the students will be able to

- Develop ladder logic for different types of starters.
- Develop ladder logic for EB to Generator changeover.
- Develop ladder logic for Automatic load transfer.
- Develop ladder logic for sequential control process like water filling, fire alarm and conveyor sorting etc.,
- To program PLCs for controlling Heater and motors.

DETAILED SYLLABUS PROGRAMMABLE LOGIC CONTROLLER PRACTICAL LIST OF EXPERIMENTS

- 1. Interfacing of Limit switch, Reed switch and Proximity switch with PLC.
- 2. DOL starter with single phase prevention.
- 3. EB to Generator Change over switch implementation with interlocking
- 4. Star Delta starter

a.

- Single phasing preventer
- b. Adjustable star-delta transfer time
- c. Pre-settable overload trip time
- 5. Automatic load transfer
- a. Transfers load from one phase to another when one phase in a three-phase system fails
- b. Automatically restores when power is resumed
- c. Time delays are affected to prevent action during short time failure
- 6. Fill the water in the water tank and maintain the water level.
- a. When water level comes below lower-level switch ON the pump
- b. When water level reaches the high level switch OFF the pump
- c. Include a manual switch to operate the pump at any level of water.
- 7. Fire alarm
- a. Multiple alarms
- b. Sound alarm

- c. If not acknowledged, Sound alarms 1 and 2
- d. Similarly go up to 4 alarm conveyor belt sorting
- 8. Three floor Lift control
- 9. Traffic light control
- 10. Automatic operation of double acting pneumatic cylinder Multi cycle
- 11. Sequential operation of two Double Acting Cylinders for the sequence A+,B+,B-,A
- 12. Analog input to PLC as a set of valves for a comparator function block

-The input is multilevel illumination control. The input is set by means of a potentiometer in an analog input to the PLC. The outputs turn on several groups of lamps to obtain desired level illumination.

13. Heater control with PID function of the PLC

- A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a temperature transmitter with 4 to 20 mA output and Pt 100 Probe.

14. Round table liquid filling system

- Dropping of Reagents into test tubes. The feedback is from potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti- clockwise revolution.

15. Slow speed motor control using PWM function of the PLC

- Slow speed 12V DC 18W permanent magnet motor with flywheel is controlled with the PWM output and feedback from a low resolution encoder.

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

SI. No	LIST OF EQUIPMENT	QUANTITY REQUIRED
1.	PLCs suitable to conduct above Experiments	3
2.	Limit Switch	1
3.	Reed Switch	1
4.	Inductive Proximity Sensor	1
5.	Capacitive Proximity Sensor	1
6.	PC (or) Laptop	3

DETAILED ALLOCATION OF MARKS

Sl. No	NAME OF ACTIVITY	MARK ALLOCATION
	Drawing Connection/Ladder Diagram and	
1.	Writing Details of the	20
	Components/Equipment/Machines used	
2.	Making the correct circuit connections	25
	Conducting the Experiment	
2	- Following the correct procedure	30
5.	- Verifying the operation / appropriate readings	
	- Following the appropriate safety procedure	
4	Tabulation of Readings / Interpretation of	20
4.	Results Graphical Representation (If required)	20
5.	Viva-voce	05
	Total Marks	100

: Electrical and Electronics Engineering
: 4030543
: V
: Renewable Energy Sources Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Subject Instructions		Examination				
4030543 Hours		Hours /		Marks			
Renewable Energy	/ Week	ible / Week Semester	Semester	Internal Assessment	Board Examinations	Total	Duration
Sources Practical	5	80	60	100*	100	3 Hrs.	

*Examinations will be conducted for 100 marks and it will be reduced to 40 Marks.

RATIONALE

Modern world aims to tap and utilize the Renewable Energy Sources as they are available almost at free of cost and eco-friendly nature. Our government also promotes the utilization of Renewable Energy Sources in full mind.

OBJECTIVES

- To measure the Solar Radiation
- To study the I-V and P-V Characteristics of PV Modules
- To measure Power flow of standalone PV System
- To study Solar Thermal Equipment.

DETAILED SYLLABUS

Contents: Practical			
Name of the topic	Exp. No	Experiment	
	1	Measurement of Solar Radiation	
	2	I-V and P-V Characteristics of PV Module	
	3	I-V and P-V Characteristics of PV Module	
Solar PV Module	4	I-V and P-V Characteristics of PV Modules in Parallel	
	5	Effect of Tilt Angle on PV Module power	
	6	Effect of shading on output of Solar Panel	
	7	Working of Blocking Diode	
	8	Power flow calculation of standalone PV System for AC Load	
Power flow calculation	9	Power flow calculation of standalone PV system for DC Load	
	10	Calculation of Maximum Power Point	
	11	Direct type Solar Dryer	
Solar Thormal	12	Indirect type Solar Dryer	
	13	Solar Water Heater	
conversion	14	Solar Cooker	
	15	Solar Air Heater	
Wind mill	16	Demo model of Wind Mill	

DETAILED ALLOCATION OF MARKS

Sl. No.	Name of the Activity	Marks Allocation
1	Procedure	25
2	Sketches/Circuit diagram	25
3	Tabulation	15

4	Calculation/graph	15
5	Result	15
6	Viva – voce	05
	TOTAL	100

Ex. No	Equipments	Ouantity
1	Solar panel PV Training Kit	6
2	Infra-red Thermometer	1
3	Lux Meter	2
4	Solar Power Meter	1
5	Solar Panel 100 Watts (Mono -1, Poly – 2)	3
6	Inverter (PWM, MPPT – 1 no. Each)	2
7	Battery 12V, 13 AH	1
8	Charge Controller 12V/10A	2
9	MC Voltmeter $(0 - 100V)$	6
10	MC Ammeter $(0 - 15A)$	6
11	AC/DC Digital Tong Tester	2
12	Rheostat 50 Ohm	1
13	Direct type Solar Dryer Kit	1
14	Indirect type Solar Dryer Kit	1
15	Solar Water Heater Kit	1
16	Solar Cooker Kit	1
17	Solar Air Heater Kit	1
18	Model WindMill	1

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

Course Name Subject Code Semester Subject Title : Diploma in Electrical and Electronics Engineering

: 4030550

: V Semester

: COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination			
4030550	Hours	Hours /		Marks		
COMPUTER	/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration
ELECTRICAL			Assessment	Examinations		
DRAWING	4	64	60	100*	100	3 Hrs.
PRACTICAL						

*Examinations will be conducted for 100 marks and it will be reduced to 40 Marks. RATIONALE

This subject is introduced in order to impart the skill of making Computer Aided Electrical Drawing. **OBJECTIVES**

At the end of the semester the students must be able to draw:

- 2D Diagrams using Auto CAD
- Symbols widely used in Electrical and Electronics Circuits
- Single Line Diagram of different types of Panels.
- Single Line Diagrams of Substation Layout.
- Winding Diagrams
- Line Diagram of Distribution Panels

DETAILED SYLLABUS

PART-A

ELECTRICAL SYMBOLS-DRAWING

1. Draw the symbols for Components: Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, and Gates AND, OR, NOT, NAND, NOR, EXOR.

2. Draw the Symbols used in Electrical Wiring: Relays, Contactors, Fuses, Main Switch, Electric Bell, Earth, DPST, DPDT, TPST, and Neutral Link.

3. Draw the Symbols for Instruments: Ammeter, Voltmeter, Wattmeter, Energy Meter, Frequency Meter, Power Factor Meter, Timer and Buzzers.

4. Draw the Symbols for Machines: Armatures, Alternators, Field winding (Shunt, Series and Compound) Transformer and Autotransformer.

PART-B

ELECTRICAL CONNECTION DIAGRAMS- DRAWING

- 1. Draw the Single Line Diagram of the Single Phase MCB Distribution Board.
- 2. Draw the Single Line Diagram of Three Phase MCB Distribution Board.
- 3. Draw the Single Line Diagram of a typical MV Panel.
- 4. Draw the Single Line Diagram of the Motor Control Centre (MCC) Panel.
- 5. Draw the Single Line Diagram of Fire Alarm Riser Arrangement in MultiStorey Building.
- 6. Draw the Single Line Diagram of Intercom Arrangement in Multi Storey Building.
- 7. Draw the Front-End Schematic Diagram of a typical Sub Switch Board (SSB).

8. Draw the Winding Diagram of Lap Connected DC Armature with Commutators Connections and Brush Positions.

- 9. Draw the Control and Main Circuit of Automatic Star Delta Starter.
- 10. Draw the Mush Winding Diagram of a Three Phase Induction Motor.
- 11. Draw the Concentric Winding Diagram of a Single-Phase Induction Motor.

(1*60=60)

(5*2=10) FET. SCR.

NOTE FOR EXAMINERS

- 1. Five symbols should be asked from part A exercise 1 to 4 with at least one from each.
- 2. One sketch should be asked from part B exercise 1 to 13.
- 3. Printed output of the given symbols and sketch is to be evaluated

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S. No	NAME OF THE EQUIPMENT	QUANTITY REQUIRED
1	PC – Pentium Dual Core	30
2	Electrical CAD Software multi user	01
3	UPS – 5KVA with half an hour battery backup	01

ALLOCATION OF MARKS

Sl. No	NAME OF ACTIVITY	MARK ALLOCATION
1.	SYMBOLS IN CAD	20
C	MANUAL DRAWING OF ELECTRICAL	20
2.	CONNECTION DIAGRAM	20
3.	ELECTRICAL CONNECTION DIAGRAM IN CAD	40
4.	PRINT OUT	15
5.	VIVA VOCE	05
	Total Marks	100

Course Name : All Branches of Diploma in Engineering and Technology Subject Code : 4030560 Semester : V Subject Title : MICROCONTROLLER AND ITS APPLICATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	istructions		Examination		
4030560	Houng Houng /		Marks			
MICROCONTRO	/ Wook	nours /	Internal	Board	Total	Duration
LLER AND ITS	/ Week	Semester	Assessment	Examinations	Totai	
APPLICATION	4	64	40	100*	100	2 Urs
PRACTICAL	4	04	40	100 '	100	5 1115.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

RATIONALE:

The introduction of this subject will enable the students to have hands-on experience in using 8051 trainer kits. The students are exposed to learn simple programs using assembly language. They can also get familiar with the C compiler platform. They also gain knowledge by using application specific interfacing boards.

OBJECTIVES:

The students are able to

➤ Understand the use of instruction set by writing and executing simple ALP.

> Know the connection details between microcontroller and peripherals.

DETAILED SYLLABUS

Contents: Practical Exercises Part A

The following experiments should be written using the 8051 assembly language program and should be executed in the 8051-Microcontroller trainer kit.

- 1.8/16 bit addition
- 2.8/16 bit subtraction
- 3. 8 bit multiplication
- 4.8 bit division
- 5. BCD to Hex code conversion
- 6. Hex to BCD code conversion
- 7. Smallest / Biggest number
- 8. Time delay routine (Demonstrate by Blinking LEDS).
- 9. Using Timer/ counter of 8051

Part B

(Interfacing Application Boards) The following experiments can be written using C compiler for 8051 assembly language and to be executed.

- 10. Interfacing Digital I/O board
- 11. Interfacing DAC
- 12. Interfacing Stepper motor
- 13. Interfacing Seven segment LED display or LCD
- 14. Sending data through the serial port between microcontroller kits
- 15. Interfacing DC motor using PWM.

BOARD EXAMINATION

Note:

1. Students are provided with a Hex code sheet for manual hand assembly.

I ····	DETAILED ALLOCATION OF MARKS					
Sl. No	NAME OF ACTIVITY	MARK ALLOCATION				
1.	ALGORITHM OR FLOW CHART	20				
2.	PROGRAM	30				
3.	EXECUTION	30				
4.	RESULT	10				
5.	VIVA VOCE	10				
	Total Marks	100				

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.No	NAME OF THE EQUIPMENT	QUANTITY REQUIRED
1	8051 Microcontroller Kit	14
2	Digital I/O Interface Board	2
3	Seven Segment LED Display Interface Board	2
4	8 Bit DAC Interface Board	2
5	Stepper Motor Control Interface Board	2
6	DC Motor Control Interface Board	2
7	RS 232 Serial Port Cable	2
8	LCD Interface Board	2
9	Laptop / Desktop Computer	6

: Diploma in Engineering and Technology : 4030570

Course Name Subject Code Semester Subject Title

: V

: ENTREPRENEURSHIP AND STARTUPS TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination			
4030570	Hours	Hours /	Marks			Derestiere
ENTREPRENE / Wee URSHIP AND		Semester	Internal Assessment	Board Examinations	Total	Duration
STARTUPS	4	64	40	60	100	3 Hrs.

Topics and Allocation of Hours

Unit No	Topics	Hours				
Ι	Entrepreneurship – Introduction and Process	10				
II	Business Idea and Banking	10				
III	Startups, E-cell and Success Stories	10				
IV	Pricing and Cost Analysis	10				
V	Business Plan Preparation	10				
	14					
	Total 64					

RATIONALE:

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspirations of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promoting concern for excellence. In this context the course on entrepreneurship and startups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs relevant to social prosperity and thereby ensuring good means of living for every individual, providing jobs and developing the Indian economy.

OBJECTIVES:

At the end of the study of 5th semester the students will be able to

- To excite the students about entrepreneurship
- Acquiring Entrepreneurial spirit and resourcefulness
- Understanding the concept and process of entrepreneurship
- Acquiring entrepreneurial quality, competency and motivation
- Learning the process and skills of creation and management of entrepreneurial venture
- Familiarization with various uses of human resource for earning dignified means of living
- Know its contribution in and role in the growth and development of individual and the nation
- Understand the formation of E-cell
- Survey and analyze the market to understand customer needs
- Understand the importance of generation of ideas and product selection
- Learn the preparation of project feasibility report
- Understand the importance of sales and turnover
- Familiarization of various financial and non-financial schemes
- Aware the concept of incubation and starts ups

U	nit	Name of the Topics	Hours
		ENTREPRENEURSHIP – INTRODUCTION AND PROCESS	
		Concept, Functions and Importance	
		• Myths about Entrepreneurship	
		• Pros and Cons of Entrepreneurship	
		Process of Entrepreneurship	
		Benefits of Entrepreneur	
		Competencies and Characteristics	
	1	Ethical Entrepreneurship	
	1	• Entrepreneurial Values and Attitudes	10
		Motivation	
		• Creativity	
		• Innovation	
		• Entrepreneurs - as problem solvers	
		• Mindset of an employee and an entrepreneur	
		• Business Failure – causes and remedies	
		• Role of Networking in entrepreneurship	
		BUSINESS IDEA AND BANKING	
		• Types of Business: Manufacturing, Trading and Services	
		• Stakeholders: Sellers, Vendors and Consumers	
		E- Commerce Business Models	
		• Types of Resources - Human, Capital and Entrepreneurial tools	
		Goals of Business and Goal Setting	
		• Patent, copyright and Intellectual Property Rights	
	2	 Negotiations - Importance and methods 	10
		Customer Relations and Vendor Management	10
		• Size and Capital based classification of business enterprises	
		Role of Financial Institutions	
		• Role of Government policy	
		• Entrepreneurial support systems	
		• Incentive schemes for State Government	
		Incentive schemes for Central Government	
		STARTUPS, E-CELL AND SUCCESS STORIES	
		Concept of Incubation center	
		• Activities of DIC, financial institutions and other relevance institutions	
		• Success stories of Indian and global business legends	
	_	• Field Visit to MSME's	
	3	• Various sources of Information	10
		• Learn to earn	
		• Startup and its stages	
		• Role of Technology – E-commerce and social media	
		• Role of E-Cell	
		• E-Cell to Entrepreneurship	
		PRICING AND COST ANALYSIS	
1		• Calculation of Unit of Sale, Unit Price and Unit Cost	
	4	• Types of Costs - Variable and Fixed, Operational Costs	
	4	• Break Even Analysis	10
1		• Understand the meaning and concept of the term Cash Inflow and Cash Outflow	10
1		• Prepare a Cash Flow Projection	
1		• Pricing and Factors affecting pricing	

	• Understand the importance and preparation of Income Statement	
	 Launch Strategies after pricing and proof of concept 	
	• Branding - Business name, logo, tag line	
	Promotion strategy	
	BUSINESS PLAN PREPARATION	
	• Generation of Ideas,	
	Business Ideas vs. Business Opportunities	
	• Selecting the Right Opportunity	
	Product selection	
	• New product development and analysis	
5	• Feasibility Study Report – Technical analysis, financial analysis and commercial	10
5	analysis	10
	Market Research - Concept, Importance and Process	
	• Marketing and Sales strategy	
	• Digital marketing	
	Social Entrepreneurship	
	Risk Taking-Concept	
	Types of business risks	

TEXT BOOKS:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra -282002

2. Dr. G.K. Varshney, Business Regulatory Framework, Sahitya Bhawan Publications, Agra – 282002

REFERENCE BOOKS:

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301

2. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and small business management, Pearson Education India, Noida - 201301

3. Charantimath Poornima M. Entrepreneurship Development and Small Business Enterprises, Pearson Education, Noida - 201301

4. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301

5. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044

6. Prasanna Chandra, Financial Management, Tata McGraw Hill education private limited, New Delhi

7. I. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan

8. Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai - 600018

9. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioner's guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

SEMESTER - VI

Course Name Subject Code Semester Subject Title : Diploma in Electrical and Electronics Engineering

: 4030610 : VI

: Distribution and Utilization

TEACHING AND SCHEME OF EXAMINATION

				No of wee	eks per semest	er: 16 weeks
Subject	Instr	uctions		on		
4030610	Hanna	Harra /		Marks		
Distribution	Hours	Hours /	Internal	Board	Tatal	Duration
and	/ WEEK	Semester	Assessment	Examinations	Total	
Utilization	6	96	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Unit No	Topics	Hours			
Ι	Distribution	20			
II	Industrial Drives	18			
III	Electric Traction	17			
IV	Illumination	17			
V	Electric Heating and Welding	17			
	Test and Model Exam 7				
	Total	96			

RATIONALE

Electrical Energy requirement is the major crisis and hence any saving in Electrical energy is equivalent to production of Electrical Energy. Saving can be achieved by the utilization of Renewable Energy Sources.

OBJECTIVES

Contents. Theory

At the end of the Semester, Students will be able to understand the concepts of :

- Substation arrangements.
- Distribution of Power.
- Industrial Drives Suitability for different applications.
- Track Electrification-Traction Mechanics Traction Motor Controls
- Illumination Design of Lighting Schemes Sources of Light.
- Electric Heating Methods Electric Furnace Temperature Control.
- Electric Welding and Welding Equipment.

Conten	its. Theory	
Unit	Name of the Topic	Hours
	DISTRIBUTION	
	1.1. Substation: Introduction-SubStations-Classification of SubStations-Indoor and Outdoor	
	S.S – Gas Insulated S.SComparisons-Layout 110/11KV Substation and 11KV/400V	
	Distribution Substation-Substation Equipments-Busbar- Types of Bus Bar Arrangement -	
т	Advantages and Disadvantages.	20
1	1.2 Distribution: Distribution System-Requirements of a Distribution System-Part of	20
	Distribution System- Classification of Distribution Systems-Comparison of Different	
	Distribution Systems (A.C And D.C) -A.C Distribution -Types-Connection Schemes of	
	Distribution System-A. C Distribution Calculations Calculation of Voltage At Load Points on	
	Single Phase Distribution Systems (With Concentrated Load Only)- Distribution Fed At One	

	End, Both Ends and Ring Mains-Problems- Three Phase, Four Wire, Star Connected	
	Unbalanced Load Circuit- Problems Consequence of Disconnection of Neutral in Three Phase	
	Four Wire System (Illustration with an Example)	
Π	INDUSTRIAL DRIVES Introduction to Electric Drive – Advantages of Electric Drives – Transmission of Power-Types of Electric Drives-Individual, Group and Multi Motor Drives – Advantages and Disadvantages of Individual And Group Drive -Factors Governing The Selection of Motors-Nature and Classification of Load Torque-Matching of Speed Torque Characteristics of Load and Motor- Standard Ratings of Motor- Classes of Load Duty Cycles -Selection of Motors for Different Duty Cycles-Selection of Motors for Specific Application-Braking- Features of Good Braking System- Types of Braking - Advantages of Electric Braking - Plugging, Dynamic and Regenerative Braking - As Applied to Various Motors.	18
	ELECTRIC TRACTION	
III	Introduction To Traction Systems - Advantages and Disadvantages of Electric Traction. System of Track Electrification - Methods of Supplying Power-Rail Connected System and Over Head System-O.H. Equipments-Contact Wire, Centenary and Droppers – Current Collection Gear for OHE –Bow and Pantograph Collector-Different Systems of Track Electrification-Advantages of Single Phase Low Frequency A. C. System- Booster Transformer-Necessity- Methods of Connecting B.T-Neutral Sectioning. Traction Mechanics: Units and Notations used in Traction Mechanics-Speed Time Curve for Different Services - Simplified Speed Time Curve-Derivation of Maximum Speed-Crest Speed, Average Speed, Schedule Speed (Definitions Only)-Tractive Effort and Power Requirement- Specific Energy Output- Specific Energy Consumption - Traction Motors and Control: Desirable Characteristics of Traction Motors-Motors used for Traction Purpose- Methods of Starting and Speed Control of D.C Traction Motors- Rheostatic Control-Energy Saving with Plain Rheostatic Control Series- Parallel Control- Energy Saving with Series Parallel Starting - Shunt Transition -Bridge- Transition- Multiple Unit Control –Regenerative Braking. Recent Trends in Electric Traction-Magnetic Levitation (MEGLEV) – Suspension Systems.	17
IV	Introduction -Definition and Units of Different Terms used in Illumination-Plane Angle, Solids Angle, Light, Luminous Flux, Luminous Intensity, Luminous Efficacy Candle Power, Lumen, Illumination, M.S.C.P, M.H.C.P, M.H.S.C.P- Reduction Factor, Luminance, Glare Lamp Efficiency. Space-Height Ratio, Depreciation Factor Utilization factor, waste light factor, Absorption Factor, Beam Factor, Reflection Factor. Requirements of Good Lighting System- Laws of Illumination Problems. Types of Lighting Scheme- Factors to be Considered while Designing Lighting Scheme- Design of Lighting Scheme (Indoor and Outdoor)- Problems- Lighting Systems- Factory Lighting, Flood Lighting, Street Lighting. Sources of Light:	17
	Arc Lamp, Incandescent Lamp, Halogen Lamp, Sodium Vapour Lamp, High Pressure Mercury Vapour Lamp, Fluorescent Tube –Induction Lamp- Energy Saving Lamps (C.F.L And L.E.D Lamps)-Limitation and Disposal Of C.F.L-Benefits of Led Lamps-Comparison of Lumen Output for LED, CFL and Incandescent Lamp Earthing and Maintenance of Lighting: Fluorescent Lamp Disposal – Precautions in erecting lighting installations – Symptoms to	
	Identify the end of the useful life of lamp – Causes for lowering the illumination level.	
v	ELECTRIC HEATING AND WELDING Electric Heating: Introduction – Advantages of Electric Heating – Modes of Heat Transfer - Classification of Electric Heating - Power Frequency Electric Heating – Direct and Indirect Resistance Heating-Infrared Heating-Arc Heating –High Frequency Electric Heating – Induction Heating-Induction Stove –Eddy Current Heating and Dielectric Heating.	17

 Electric Furnaces: Resistance Furnace-Requirements of Heating Elements-Commonly used Heating Element Materials- Resistance Furnace for Special Purposes-Temperature Control of Resistance Furnace-Arc Furnace -Direct and Indirect Arc Furnace Temperature Control of Arc Furnace-Reasons for Employing Low Voltage and High Current Supply - Induction Furnace-Direct and Indirect Core Type Induction Furnace- Coreless Induction Furnace-Power Supply for Coreless Induction Furnace.
 Electric Welding: Introduction-Types of Electric Welding Requirements of Good Weld-Preparation of Work -Resistance Welding- Butt Welding, Spot Welding, Seam Welding, Projection Welding and Flash Welding-Arc Welding-Carbon Arc Welding, Metal Arc Welding, Atomic Hydrogen Arc Welding, Inert Gas Metal Arc Welding- Comparison between Resistance and Arc Welding . Radiation Welding- Ultrasonic welding , Electron Beam Welding, Laser Beam Welding-Electric Welding Equipments (A.C. And D.C)

TEXT BOOK

Sl.No	Name of the Book	Author	Publisher	Edition
1	A Course in Electrical Power	Soni & Gupta	Dhanpat Rai & Sons, New Delhi	

REFERENCE BOOKS:

Sl.No	Name of the Book	Author	Publisher	Edition
1	Electric Power	Power SL Uppal Khanna Publishers, New Delhi		
2	Modern Electric Traction	H Pratab Dhanpat Rai & sons, New Delhi		
2	Electrical Power	AS Dabla	Tata McGraw Hill Publishing Co,	
5	Distribution System	AS Fabla	New Delhi	
4	Utilization of Electric	NU Survenerevene	Tata McGraw Hill Publishing Co,	
4	Power	in v Suryallarayalla	New Delhi	

: Diploma in Electrical and Electronics Engineering

: 4030620

: VI

: Energy Conservation and Audit

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Subject Instructions			Examinat	ion	
4030620	TT	TT (Marks		
Energy Conservation	Hours / Week	Hours / Semester	Internal Assessment	Board Examinations	Total	Duration
and Audit	4	64	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks. Topics and Allocation of Hours

Unit No	Topics	Hours			
Ι	I Energy Conservation and its Importance				
II	II Energy Conservation in Electrical Machines				
III	III Energy Conservation in Electrical Installation Systems				
IV	Energy Audit and Instruments	12			
V	Energy Costs and Energy Audit Report	12			
	Test and Model Exam				
	Total	64			

RATIONALE

Course Name

Subject Code

Subject Title

Semester

Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service. Energy can be conserved by reducing wastage and losses, improving efficiency through technological upgrades and improved operation and maintenance. Energy Audit is the key to a systematic approach for decision-making in the area of energy management. The effective use of energy to maximize profits (minimize costs) and enhance competitive positions, it is necessary to conserve energy. Hence it is necessary to study energy auditing methods and energy saving opportunities in electrical systems.

OBJECTIVES

At the end of the Semester, Students will be able to:

- Explain necessity and importance of Energy Conservation
- Explain the goal with energy conservation techniques is to reduce demand, protect supplies, develop and use Alternative Energy Sources.
- Explain the energy efficient technologies in Electrical System
- Explain the Periodic maintenance of Electrical Systems.
- Explain Technical losses and commercial losses in installation Systems.
- Explain How to produce output or to lower operating costs.
- Discuss about Energy Conservation Equipment
- Explain Energy Conservation in Lighting System
- Identify where and how energy and factors affecting consumption are consumed.
- Explain Energy Costs.
- Explain how to Detect and improve energy Efficiency.
- Explain the concept and types of Energy of Energy Audit.
- Explain the importance of Energy Audit.
- List the Instruments for Audit and Monitoring Energy and Energy Savings
- Explain Energy cost in Indian Scenario.
- Draw the Energy Audit Report Format

Contents	: Theory	
Unit	Name of the Topic	Hours
I	ENERGY CONSERVATION AND ITS IMPORTANCE Definition - Need for and importance of Energy Conservation - Primary and Secondary Energy - Energy Demand and Supply - Energy Conservation in Household, Industries and Community Level - Energy for sustainable Development - Energy Conservation in India - Energy Conservation Approaches – Safe working of Electrical Equipments and Electrical Safety. Energy Conservation Techniques - Principles of Energy Conservation Methods - Difference between Energy conservation and Energy audit - Relevant clauses of Energy Conservation - BEE and its Roles - MEDA and its Roles - Energy Audit in Energy Conservation Star	5
II	Labeling: Need and its benefits – Role of Puducherry Energy Development Agency (TEDA) – Introduction to ISO 50001 – Energy Audit Certificate. ENERGY CONSERVATION IN ELECTRICAL MACHINES Need for Energy Conservation in Induction Motor and Transformer - Methods of Energy Conservation in Induction Motor - Energy Saving Opportunities with Energy Efficient Motors - Energy Conservation Techniques in Induction Motor By: Improving Power Quality -Variation in Efficiency and Power Factor with Loading Motor Survey Matching Motor Rating with Load - Minimizing the Idle and Redundant Running of Motor Operating in Star Mode -Rewinding of Motor - Replacement by Energy Efficient Motor Periodic Maintenance Energy Conservation Techniques in Transformer. Loading Sharing Parallel Operation Isolating Techniques. Replacement by Energy Efficient Transformers - Periodic Maintenance - Energy Conservation Equipment: Soft Starters, Automatic Star Delta Convertor, Variable Frequency Drives, Automatic P. F. Controller (APFC), Intelligent P. F. Controller (IPFC)Energy Efficient Motor; Significant Features, Advantages, Applications and Limitations.	6
III	ENERGY CONSERVATION IN ELECTRICAL INSTALLATION SYSTEMS Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level. Technical losses; causes and measures to reduce by - Controlling I2R losses. Optimizing distribution voltage. Balancing phase currents Compensating reactive power flow Commercial losses: pilferage causes and remedies. Energy conservation equipment: Maximum Demand Controller, KVAR Controller, Automatic Power Factor controller (APFC) Energy Conservation in Lighting System Replacing Lamp sources. Using energy efficient luminaires. Using light-controlled gears. Installation of separate transformer / servo stabilizer for lighting. Periodic survey and adequate maintenance programs. Energy Conservation techniques in fans, electronic regulators.	6
IV	ENERGY AUDIT AND INSTRUMENTS Definition, objective and principles of Energy Management, Need of Energy Audit and Management, types of Energy Audit, Audit Process, Energy Audit of Building System, Lighting System, HVAC System, Water Heating System, Heat Recovery opportunities during Energy Audit, Industrial Audit Opportunities. Energy Flow Diagram (Sankey Diagram) Simple Payback Period, Energy Audit Procedure (walk through audit and detailed audit) Instruments for Audit and Monitoring Energy and Energy Savings Energy Audit Instruments - Basic Measurements – Electrical Measurements, Light, Pressure, Temperature and Heat Flux, Velocity and Flow Rate, Vibrations, etc. Instruments Used in Energy systems: Load and Power Factor Measuring Equipments, Wattmeter, Flue Gas Analysis, Temperature and Thermal Loss Measurements, Air Quality Analysis etc.	6

		ENERGY COSTS AND ENERGY AUDIT REPORT	
		Understanding Energy Costs Energy Cost in Indian Scenario - Cogeneration and Tariff -	
		Concept, Significance for Energy Conservation - Cogeneration - Types of Cogenerations on	6
		basis of sequence of Energy use (Topping cycle, bottoming cycle) - Types of Co-generation	
v		basis of Technology (Steam Turbine Co-generation, Gas Turbine Co-generation,	
	V	Reciprocating Engine Co-generation)	
	v	Factors governing the selection of Co-generation System. Advantages of Co-generation -	
		Tariff: Types of Tariff Structure: Special Tariffs; Time-Off Day Tariff, Peak-Off-Day Tariff,	
		Power Factor Tariff, Maximum Demand Tariff, Load Factor Tariff - Application of Tariff	6
		System to reduce Energy bill. Benchmarking and Energy Performance - Energy Audit	
		Report Format - Guidelines for writing Energy Audit Report - Data presentation in Report.	

TEXT BOOKS:

1. "M A Chaudhari, S M Chaudhari & S A Asarkar ", "Energy Conservation & Audit ", "Nirali Prakashan" Publication.

2. "Y. B. Mandke", "Pankaj Mohan", "Dr. D.B. Talange" Energy Conservation and Audit, "Tech – Neo" Publications.

REFERENCE BOOKS

1. "Er. Udit Mamodiya" "Electrical Energy Conservation & Auditing", Ashirwad Publication.

2. O.P. Gupta, "Energy Technology", Khanna Publishing House, New Delhi
| Course Name | : Diploma in Electrical and Electronics Engineering |
|---------------|---|
| Subject Code | : 4030631 |
| Semester | : VI |
| Subject Title | : POWER ELECTRONICS |
| | |

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination					
4020621	Houng Houng		Marks					
4030631 POWER	/ Week S	Semester	Internal Assessment	Board Examinations	Total	Duration		
ELECTRONICS	5	80	40	100*	100	3 Hrs.		

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Unit No	Topics	Hours				
Ι	Thyristor Family, Trigger and Commutation Circuits	13				
II	Phase Controlled Rectifiers	15				
III	Choppers and Inverters	15				
IV	Control of DC Drives	15				
V	Control of AC Drives	15				
Test and Model Exam 7						
	Total 80					

Topics and Allocation of Hours

RATIONALE

Developments in Electronics have their own impact in other fields of Engineering. Today all the Controls and Drives for the Electrical Machines are formed by Electronic Components and there are many Electronic Devices available to handle Eclectic Power in terms Kilo-Amps and Kilo-Volts. This subject gives a comprehensive knowledge base about the devices and circuits used in Electrical Power Control.

OBJECTIVES

Contents: Theory

On completion of these units, the student should be able to:

- Explain the scope and application of Power Electronics
- Explain the operating region and working of Thyristor family devices.
- Explain and state the application for Commutation Circuits and Trigger Circuits of SCR.
- Familiarize the Phase Controlled Rectifier for different kinds of Loads.
- Study the complete protection of Converter Circuits.
- Understand the working and applications of different types of Choppers and Inverters.
- Understand the application of Power Electronics devices as UPS, SMPS.
- Understand the control of DC Drives.
- Know the various methods of Speed Control of DC Drives.
- Familiarize the Control of AC Drives.
- Understand the Closed Loop Control of DC Drive and AC Drive.
- Know the operation of Single Phase and Three Phase Cyclo Converter.
- Study the need of Microcomputer Based Motor Control.

DETAILED SYLLABUS

Unit	Name of the Topic			
	THYRISTOR FAMILY, TRIGGER AND COMMUTATION CIRCUITS Thyristor Family			
Ι	(Review) -SCS, SUS, SBS, LASCR and GTO. Symbol, Circuit, Working, Characteristics and	13		
	Applications - UJT, SCR, DIAC, TRIAC, IGBT, GTO and MOSFET. Gate Triggering Circuits			

	- Requirements, Types. Circuit, working of - R, RC, Synchronized UJT Triggering Circuits.	
	Pulse Transformer in Trigger Circuits — IC based Advance Triggering Circuits for SCR &	
	TRIAC (Using IC TCA 785) - Driver and Power circuits for Thyristor.	
	Commutation Circuits – SCR Turn Off Methods – Natural Commutation –Forced Commutation	
	- Class A, Class B, Class C, Class D, Class E and Class F. SCR rating and their importance.	
	PHASE CONTROLLED RECHTFIERS	
	Introduction – Phase Controlled Rectifier with Desigting Industry Loads and Free Wheeling Diede	
	Single Phase Fully Controlled Bridge Single Phase Dual Converter with D Load, DL Load	
II	- Single Phase Fully Controlled Bridge, Single Phase Dual Converter with R Load, RL Load -	15
	Single Phase Senii Converter with Continuous and Discontinuous Load Current. AC – AC	
	Converter.	
	Protection of Thuristors against Surge Current, Surge Voltage, Dv/Dt, Di/Dt Protection	
	CHODDEDS AND INVEDTEDS	
	Choppers Introduction Principle of Chopper Operation Control Strategies Constant	
	Frequency System and Variable Frequency System Chopper Circuit Classification – Step Up	
	Chopper Step Down Chopper Voltage Current Load Commutated Chopper First Quadrant	
	Second Quadrant Two Quadrant and Four Quadrant Choppers Circuit Diagram Working and	
III	Waveform – Step Up Chopper, Morgan Chopper, Jones Chopper, Applications of Choppers –	
	SMPS	15
	Inverters – Introduction, Classification of Inverter, Circuit Diagram, Working and Waveform	-
	Parallel Inverter, Half Bridge Inverter, Full Bridge Inverter, Modified MCMurray Full Bridge	
	Inverter, MCMurray Bedford Full Bridge Inverter.	
	Three Phase Bridge Inverter Under 180° Mode, 120° Mode Operations - Pulse Width Modulated	
	Inverters, (Single Pulse, Multiple Pulse, Sinusoidal Pulse) Applications of Inverters - UPS -	
	Online, Offline.	
	CONTROL OF DC DRIVES	
	Introduction - DC Drive. Basic DC Motor Speed Equation - Operating Region, Armature	
	Voltage Control, Field Current Control, Constant Torque and Constant HP Regions - Circuit	
	Diagram, Output Waveforms and Output Equation of $-$ Separately Excited DC Motor in $-$ A)	
IV	Single Phase Full Converter Drives B) Single Phase Dual Converter Drives C) Three Phase Semi	15
	Converter Drives.	
	DC Chopper for Series Motor Drive – Four Quadrant Control of DC Motor – DC to DC Converter	
	Using MOSFET and IGBT - Block Diagram, Explanations of Closed Loop Control of DC Drives, Disease Looked Loop Control of DC Drives, Micropropassor Based Closed Loop Control of DC	
	Phase Locked Loop Control of DC Drives - Microprocessor Based Closed Loop Control of DC	
	CONTROL OF AC DRIVES	
	Introduction AC Drive - Torque Speed Characteristics of Three Phase Induction Motor Speed	
	Control of Induction Motor, Stator Voltage Control, Variable Frequency Control, Necessity of	
	Maintaining V/F Ratio Rotor Resistance Control Inverters for Variable Voltage and Variable	
v	Frequency Control -Static VAR Compensation	15
	Speed Control by Rotor Resistance for Slip Ring Induction Motors – Static Scherbius Drive (Slip	10
	Power Recovery Scheme) - Closed Loop Control of AC Drive Block Diagram – Micro Computer	
	based PWM Control of Induction Motor – Introduction to Cycloconverter with Simple Circuit –	
	Single Phase and Three Phase.	
TEV		

SI	l. Name of the Book	Author	Publisher	Edition
1	MD Singh, KB Khanchandani	Power Electronics	McGraw Hill Publishing Company New Delhi	Third reprint 2008

REFERENCE BOOKS:

Sl. No	Name of the Book	Author	Publisher	Edition
1	Mohammed H.Rashid	Power Electronics	New Age Publication.	Third Edition,2004
2	Mohan, Undeland, Robbins.	Power Electronics	Wiley India Edition.	Media Enhanced Third Edition
3	Dr.P.S.Bimbhra	Power Electronics	Khanna Publishers.	Fourth Edition, 2011.
4	M.S.Jamil Asghar	Power Electronics	PHI Learning Private Limited	Eastern Economy Edition, 2010

: Diploma in Electrical and Electronics Engineering

: 4030632

: VI

Semester Subject Title

Course Name

Subject Code

: BIOMEDICAL INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION

				No of weeks per	r semeste	r: 16 weeks
Subject Instructions Examination						
4020(22	Houng	Houng /	Marks			
4030632 BIOMEDICAL INSTRUMENTATION	HOURS	Hours /	Internal	Board	Total	Duration
	/ WEEK	Semester	Assessment	Examinations	Total	
INSTRUMENTATION	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Topics and Anotation of Hours					
Unit No	Topics	Hours			
Ι	Bio - Electric Signals, Electrodes and Clinical Measurement	13			
II	Bio - Medical Recorders	15			
III	Therapeutic Instruments	15			
IV	Biotelemetry and Patient Safety	15			
V	Modern Imaging Techniques	15			
VI	Revision & Test	07			
	Total	80			

Topics and Allocation of Hours

RATIONALE

BioMedical Engineering Education is in the growing stage. But every year, there is a tremendous increase in the use of Modern Medical Equipment in the Hospital and Health Care Industry therefore it is necessary for every Student to understand the functioning of various Medical Equipments. This Subject is to enable the students to learn the basic principles of different Biomedical Instruments viz Clinical Measurement, Bio - Medical Recorders, Therapeutic Instruments, Biotelemetry and Modern Imaging Techniques Instruments.

OBJECTIVES

After learning this subject, the student will be able to understand the about:

- The generation of Bio-Potential and its measurement using various Electrodes.
- The measurement of Blood Pressure.
- The measurement of Lung Volume.
- The measurement of Respiration Rate.
- The measurement of Body Temperature and Skin Temperature.
- The principles of operations of ECG Recorder.
- The principles of operations of EEG Recorder.
- The principles of operations of ENG Recorder.
- The working principles of Audio Meter.
- The principles of operations of Pacemaker.
- The basic principle of Dialysis.
- The basic principle of Short-Wave Diathermy
- The basic principle of Ventilators.
- The working principles of Telemetry.
- The basic principle of Telemedicine.
- To learn about Patient Safety.
- The various methods of Accident Prevention.
- The basic principle of various types of Lasers.
- The basic principle of CT and MRI Scanner.
- The principle of operation of various Imaging Techniques

DETAILED SYLLABUS

Conte	ents: Theory	
Unit	Name of the Topic	Hours
Ι	 BIO-ELECTRIC SIGNALS AND ELECTRODES Bio – Potential and Their Generation – Resting and Action Potential –Propagation of Action Potential. Electrodes – Micro – Skin Surface – Needle Electrodes. CLINICAL MEASUREMENT Measurement of Blood Pressure (Direct, Indirect) – Blood Flow Meter (Electromagnetic Ultrasonic Blood Flow Meter) – Blood Ph Measurement - Measurement Of Respiration Rate – Measurement of Lung Volume – Heart Rate Measurement – Measurement of Body and Skin Temperature - Chromatography, Photometry, Fluorometry. 	13
Π	BIO - MEDICAL RECORDERS ElectroCardiograph (ECG) – Lead System – ECG Electrodes – ECG Amplifiers – ECG Recording Units – Analysis of ECG Curves. Electroencephalograph (EEG) – 10-20 Lead System – EEG Recording Units – EEG Wave Types – Clinical use of EEG – Brain Tumor. Electromyography (EMG) – EMG Waves – Measurement of Conduction Velocity - EMG Recording Units – Electro Retino Graph (ERG)- ERG Recording Units, Audiometer - Principle – Types – Basics Audiometer Working.	15
Ш	THERAPEUTIC INSTRUMENTS Cardiac Pacemaker – Classification – External PaceMakers – Implantable Pacemaker – Programmable Pacemaker – Cardiac Defibrillators – Types – AC and DC Defibrillators -Heart Lung Machine with Block Diagram. Dialysis – HemoDialysis – Peritoneal Dialysis. Endoscopes Endoscopic Laser Coagulator and Applications – Physiotherapy Equipment – Short Wave Diathermy – MicroWave Diathermy – Ultrasonic Therapy Unit (Block / Circuit) – Ventilators – Types – Modern Ventilator Block Diagram.	15
IV	BIOTELEMETRY AND PATIENT SAFETY Introduction to Biotelemetry – Physiological – Adaptable to Biotelemetry – Components of a Biotelemetry System – Application of Telemetry - – Tele-medicine - Introduction, Working, Applications. Patient Safety: Physiological effects of Electric Current – Micro and Macro Shock – Leakage Current – Shock Hazards from Electrical Equipment. Methods of Accident Prevention – Grounding – Double Insulation – Protection by Low Voltage – Ground Fault Circuit Interrupter – Isolation of Patient Connected Parts – Isolated Power Distribution System. Safety Aspects in ElectroSurgical Units – Burns, High Frequency Current Hazards, Explosion Hazards.	15
V	MODERN IMAGING TECHNIQUES LASER Beam Properties – Block Diagram – Operation of CO2 And Ndyag LASER – Applications of LASER in Medicine. X Ray Apparatus –Block Diagram – Operation – Special Techniques in X-Ray Imaging – Tomogram – Computerized Axial Tomography, CT Scanner –Ultrasonic Imaging Techniques – Echo Cardiograph – Angiography – Magnetic Resonance Imaging Techniques.	15

TEXT BOOK

• Dr.M. Arumugam – Biomedical Instrumentation, Anuradha Publications, Chennai.

REFERENCE BOOKS

• Leslie Cromwell – Fred j. Wibell, Erich A.P Feather – BioMedical Instrumentation and Measurements, II Edition

- Jacobson and Webstar Medicine and Clinical Engineering.
- R.S. Khandpur Handbook of Bio Medical Instrumentation.
- Medical Electronics Kumara doss
- Introduction to Medical Electronics. B.R. Klin

: Diploma in Electrical and Electronics Engineering

Course Name Subject Code Semester Subject Title

: VI : COMPUTER HARDWARE AND NETWORKS

: 4030633

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	uctions	Examination			
4030633		Houng /	Marks			
COMPUTER HARDWARE	/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration
AND NETWORKS	5	80	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks. Topics and Allocation of Hours

Unit No	Topics	Hours				
Ι	Motherboard Components and Memory Storage Devices	13				
II	I/O Devices and Interface	15				
III	Maintenance and Troubleshooting of Desktop and Mobile Phones	15				
IV	Computer Network Devices and OSI Layers	15				
V	802.X and TCP/IP Protocols	15				
VI	Revision & Test	07				
	Total 80					

RATIONALE

Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this subject. **OBJECTIVES**

- On completion of the following units of syllabus contents, the students can Identify the major components that make up the system unit.
- Understand the principle of operations of Keyboard, mouse and displays.

• Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB – Game port, Bluetooth and IP Connectors

- Understand the technology of high-quality multiple color graphic output devices like Dot matrix, Inkjet, Laser, Line, MFP and computer systems.
- Understand the operations to Power Supply devices. Know the use of diagnostic Software. Identify the major
- Components of Laptop. Troubleshoot the problems in Laptop.
- Understand the concept of data communication.
- Know the use of different network devices.
- Understand the different layers of OSI and their functions. Compare different LAN protocols.

• Identify the protocols used in TCP /IP and compare them with the OSI model. Understand IP address concepts and TCP/IP suite.

DETRIEED STEERDES				
UNIT I - MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES				
1 1	Introduction: Parts - Motherboard, sockets, expansion slots, memory, power supply,	3		
1.1	drives and front panel and rear panel connectors - Hardware, Software and Firmware.			
1.2	Processors: Architecture and block diagram of multi core Processor (any one), Features	2		
	of new processor Definition only chipsets (Concepts only)			
1.3	Bus Standards: Overview and features of PCI, AGP, USB, PCMCIA, Processor BUS -	2		

	High			
1 /	Primary Memory: Introduction-Main Memory, Cache memory – DDR2- DDR3, RAM	1		
1.4	versions – 1TB RAM – Direct RDRAM			
	Secondary Storage: Hard Disk – Construction – Working Principle – Specification of	3		
1.5	IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting. Troubleshooting hard disk			
	drives			
	Removable Storage: CD&DVD construction – reading & writing operations; CD-R,	2		
1.6	CD- RW; DVD-ROM, DVD-RW; construction and working of DVD Reader / Writer.			
	Blue-ray: Introduction – Disc Parameters – Recording and Playback Principles – Solid			
	state memory devices.	15		
	UNIT II I/O DEVICES AND INTERFACE	HOURS		
0.1	Keyboard and Mouse: Keyboard: Signals – operation of membrane and mechanical	3		
2.1	keyboards-troubleshooting; wireless Keyboard. Mouse- types, connectors, operation of			
	optical mouse and Troubleshooting.	4		
2.2	Frinters: Introduction – Types of printers– Dot Matrix, Laser, line printer, MFP (Multi- Function Drinter) Thermal printer Operation Construction Factories	4		
2.2	runction Printer), inerinal printer - Operation – Construction – Features and			
	I/O Ports: Serial Parallel USB Game Port Bluetooth interface ID connector fire ware	2		
2.3	Signal specification problems with interfaces	5		
	Displays and Graphic Cards: Panel Displays – Principles of LED LCD and TET	3		
2.4	Displays and Oraphic Cards. Fance Displays Trinciples of LED, LED and Tri-	5		
0.7	Power Supply: SMPS: Principles of Operation and Block Diagram of ATX Power	2		
2.5	Supply, connector specifications	_		
UNIT III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE				
UNIT	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE	15		
UNIT	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES	15 HOURS		
	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced	15 HOURS 3		
3.1	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup.	15 HOURS 3		
3.1 3.2	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error	15 HOURS 3 2		
3.1 3.2	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages.	15HOURS32		
3.1 3.2	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery-	15 HOURS 3 2 3		
3.1 3.2 3.3	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board	15 HOURS 3 2 3		
3.1 3.2 3.3	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tasks & Instruments used in mobile commising hit – coldering and	15 HOURS 3 2 3		
3.1 3.2 3.3	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and deceldering components using different code. Use of multi-meter and battery 	15 HOURS 3 2 3 2 3 2 2 2 2 2 2 2		
3.1 3.2 3.3 3.4	III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery-antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery hooster	15 HOURS 3 2 3 2 3 2 2 2		
3.1 3.2 3.3 3.4	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery-antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of 	15 HOURS 3 2 3 2 3 2 3 2 3		
3.1 3.2 3.3 3.4	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Immering 	15 HOURS 3 2 3 2 3 2 2 2 2 2 2 2 2 2 2 2		
3.1 3.2 3.3 3.4 3.5	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions. 	15 HOURS 3 2 3 2 3 2 2 2 2 2 2 2 2 2 2		
3.1 3.2 3.3 3.4 3.5	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions. Software and Antivirus: Flashing- Formatting- Unlocking -Use of secret codes- 	15 HOURS 3 2 3 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3		
3.1 3.2 3.3 3.4 3.5 3.6	 III MIAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery- antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions. Software and Antivirus: Flashing- Formatting- Unlocking -Use of secret codes- Downloading- Routing; Mobile Viruses – Precautions – Antivirus Software. 	15 HOURS 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3		
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3.1 3.2 3.3 3.4 3.5 3.6 UNIT 4.1 4.2	 III MAINTENANCE AND TROUBLESHOOTING OF DESKTOP AND MOBILE PHONES BIOS: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. POST: Definition – IPL hardware – POST Test sequence – beep codes and error messages. Mobile phone components: Basics of mobile communication. Components - battery-antenna-earpiece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. Tools & Instruments used in mobile servicing: Mobile servicing kit – soldering and desoldering components using different soldering tools - Use of multi- meter and battery booster. Installation & Troubleshooting: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions. Software and Antivirus: Flashing- Formatting- Unlocking -Use of secret codes-Downloading- Routing; Mobile Viruses – Precautions – Antivirus Software. IV COMPUTER NETWORK DEVICES AND OSI LAYERS Data Communication: Components of a data communication – Data flow: simplex – half duplex – full duplex; Networks – Definition - Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology. Types of Networks: LAN – MAN – WAN – CAN – HAN – Internet –Intranet – 	15 HOURS 3 2 3 2 3 2 3 15 HOURS 3		

4.3	Transmission Media: Classification of transmission media - Guided – Twisted pair, Coaxial, Fiber optics; Unguided – Radio waves – Infrared – LOS – VSAT – cabling and standards	3
4.4	Network devices: Features and concepts of Switches – Routers (Wired and Wireless) – Gateways.	3
4.5	Network Models: Protocol definition - standards - OSI Model – layered architecture – functions of all layers.	3
UNIT	V 802.X AND TCP/IP PROTOCOLS	15 HOURS
5.1	Overview of TCP / IP: OSI & TCP/IP – Transport Layers Protocol – connection oriented and connectionless Services – Sockets – TCP & UDP	3
5.2	802.X Protocols: Concepts and PDU format of CSMA/CD (802.3) – Token bus (802.4) – Token ring (802.5) – Ethernet – type of Ethernet (Fast Ethernet, gigabit Ethernet) – Comparison between 802.3, 802.4 and 802.5	3
5.3	Network Layers Protocol: IP –Interior Gateway Protocols (IGMP, ICMP, ARP, RARP Concept only).	3
5.4	IP Addressing: Dotted Decimal Notation –Subnetting & Super netting – VLSMTechnique-IPv6 (concepts only)	3
5.5	Application Layer Protocols: FTP- Telnet – SMTP- HTTP – DNS – POP	3

TEXT BOOK

Sl.No	Name of the Book	Author	Publisher	Edition
1	Computer Installation and Servicing	D.Balasubramanian	Arasan Ganesan Institute of Technology	1993
2	The complete PC upgrade and Maintenance	Mark Minasi	BPB Publication	1997
3	Troubleshooting, Maintaining and Repairing PCs	Stephen J Bigelow	Tata MCGraw Hill Publication	2004
4	Computer Networks	Andrew S.Tanenbaum	Prentice-Hall of India, New Delhi	2002
5	Data Communication and networking	Behrouz A.Forouzan	Tata Mc-Graw Hill, New Delhi	2006
6	Data and Computer Communications	William Stallings	Prentice-Hall of India	2007

REFERENCE BOOKS:

Sl.No	Name of the Book	Author	Publisher	Edition
1	Computer Networks	Ashuut Codholo	Tata Mc-Graw Hill -	
1	Computer Networks	Activut Goudole	New Delhi	
	Principles of Wireless	Kaveh Pahlavanand		
2	Networks- A unified	Prashant	Pearson Education	2002
	Approach	krishnamoorthy		

Course Name	: Diploma in Electrical and Electronics Engineering
Subject Code	: 4030640
Semester	: VI

Semester Subject Title

: ELECTRICAL ESTIMATION AND COSTING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject Instructions			Examination			
4030640			Marks			
ELECTRICAL	/ Week S	Semester	Internal	Board	Total	Duration
ESTIMATION			Assessment	Examinations		
AND	5	20	10	100*	100	2 11
	5	80	40	100*	100	3 Hrs.
PRACTICAL						

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

RATIONALE

To enable the students to prepare the schedule of materials with specification and estimate the cost for different types of Electrical Installations. This will empower the students with the necessary principles of Planning, Electrical Rules and Method of Installations.

OBJECTIVES

On completion of the following units of syllabus contents, the students must be able to:

- Draw the Conventional Symbols for various Electrical Installations.
- To quote the relevant IE Rules for a given Electrical Installation, Earthing and clearance of Service Lines.
- Familiarize the types of Wiring.
- Explain the necessity and types of Earthing.
- Estimate the quantity of materials and cost required for Domestic and Industrial Wiring.

DETAILED SYLLABUS

Contents: Practical

Name of the Topics:

Exercise

• To study the various Electrical Symbols, IE Rules 28, IE Rules 30, IE Rules 31, IE Rules 54, IE Rules 56, IE Rules 87.

- To study the various types of Earthing.
- To study the various types of Electrical Wiring Methods.
- Estimate the quantity of material and cost required for Residential Building (1BHK).

• Estimate the quantity of material and cost required for a Computer Centre having 10 Computers, AC Unit, UPS, Light and Fan.

- Estimate the quantity of material and cost required for Industrial Power Wiring having 4 Machines
- Estimate the quantity of material and cost required for street light service having 12 Lamps Light Fitting.
- Estimate the quantity of material and cost required for 3 Phase Service connection to a building having

5KW Load.

- Estimate the quantity of material and cost required for Irrigation Pump Wiring (5HP). 1
- Estimate the quantity of material and cost required for a School Building having 3 Class Rooms.

• Estimate the quantity of material and cost required for erection of a 15 HP Induction Motor in a Saw Mill/Flour Mill.

REFERENCE BOOKS:

Sl.No	Name of the Book	Author	Publisher
1	Electrical Design Estimating and Costing	K.B.Raina&K.Battacharya	Khanna Publications.
2	Electrical Installation Estimating and Costing.	J.B.Gupta	Pearson Education
3	Electrical Wiring, Estimating and Costing.	Dr.S.L.Uppal	New age international (p) limited
4	Electrical Wiring, Estimating and Costing.	Surjit Singh	DhanpatRai company.
5	Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication.

DETAILED ALLOCATION OF MARKS

Sl.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	LAYOUT / DETAILS OF FITTING	20
2.	LOAD CALCULATION	20
3.	MATERIAL CALCULATION	30
4.	MATERIAL SCHEDULE AND APPROXIMATE COST	25
5.	VIVA VOCE	05
	Total Marks	100

: Diploma in Electrical and Electronics Engineering
: 4030651
: VI
: POWER ELECTRONICS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions			Examination		
4030651	Hours	Hours /		Marks		
POWER Hours	Hours /	Internal	Board	Total	Duration	
ELECTRONICS	/ week	Semester	Assessment	Examinations	Total	
PRACTICAL	6	96	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

RATIONALE

- The advent of Thyristors has revolutionized the art of Electric Power Conservation and its Control.
- The use of the Power Electronic Devices has pervaded the Industrial Applications relating to the field of Electrical, Electronics, Instrumentation and Control Engineering.

• This Subject is introduced to impart practical skills to the students in using some important Power Electronic Devices and Circuits.

OBJECTIVES

At the end of the Course, Students will be able to:

- Construct and test various Triggering Circuits for SCR.
- Construct and test different types of Phases Controlled Converters in various configurations at different load conditions.
- Construct and observe the performance of different types of Chopper and Inverters.
- Construct and test the performance of Open Loop and Closed Loop Control of DC and AC drives.
- Construct and test the performance of Single Phase Cyclo Converter.

DETAILED SYLLABUS

Contents: Practical

Name of the Topics: Power Electronics Practical Exercise

- 1. Construct the Line synchronized Ramp trigger circuit using UJT with AC Load to measure Firing Angles.
- 2. Construct Lamp control circuit using DIAC TRIAC to measure various output voltage for Firing Angles.
- 3. Construct and test the SCR Commutation Circuits (Class B & Class D)
- 4. Construct and test the Half Wave Controlled Rectifier with R- Load, RL Load
- 5. Construct and test the Single Phase Fully Controlled Bridge with RL- Load and Free Wheeling Diode.
- 6. Construct and test the Single-Phase Semi Controlled Bridge with R- Load
- 7. Construct and test the DC Chopper Control Circuit using Thyristor (any class).
- 8. Construct and test the Step-Up Chopper.
- 9. Construct PWM based Step Down DC Chopper using MOSFET/IGBT.
- 10. Construct and test the Single-Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT.
- 11. Construct and test the SMPS using MOSFET/IGBT.
- 12. Construct and test the Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor.
- 13. Construct and test the Control Circuit using TRIAC for Universal Motor.
- 14. Construct and test the Closed Loop Speed Control for a DC and AC Motor.
- 15. Construct and test the Single-Phase Parallel Inverter using MOSFET/IGBT
- 16. Construct and test the Single Phase to Single Phase Cyclo Converter.

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.	NAME OF THE FOUDMENT	
NO	NAME OF THE EQUI MENT	Quantity
1	Line Synchronized Ramp Trigger Circuit Using UJT Trainer Kit	1
2	Lamp Control Circuit Using DIAC – TRIAC Trainer Kit.	1
3	SCR Commutation Circuits (Class B & Class D)	1
4	Half Wave Controlled Rectifier with R- Load & RL Load Trainer Kit.	1
5	Single Phase Fully Controlled Bridge with RL- Load And Freewheeling Diode Trainer Kit.	1
6	Single Phase Semi Controlled Bridge with R- Load Trainer Kit.	1
7	Construct and Test the DC Chopper Control Circuit using Thyristor (Any Class) Trainer Kit.	1
8	Step Up Chopper Trainer Kit.	1
9	PWM Based Step Down DC Chopper using MOSFET/IGBT Trainer Kit.	1
10	Single Phase Single Pulse / Sinusoidal PWM Inverter using MOSFET/IGBT Trainer Kit	1
11	SMPS using MOSFET/IGBT Trainer Kit.	1
12	Open Loop Speed Control Circuit for DC Shunt Motor and Single-Phase AC Motor Trainer Kit	1
13	Control Circuit Using TRIAC for Universal Motor Trainer Kit.	1
14	Closed Loop Speed Control of DC and AC Motor Trainer Kit.	1
15	Single Phase Parallel Inverter using MOSFET/IGBT Trainer Kit	1
16	Single Phase to Single Phase Cyclo Converter Trainer Kit.	1
17	CRO With Power Probe	4
18	Multi Meter	5

DETAILED ALLOCATION OF MARKS

Sl. No.	Name of the Activity	Marks Allocation
1	Circuit Diagram	25
2	Connections	25
3	Procedure	20
4	Reading/Graph/Result	25
5	Viva – voce	05
	TOTAL	100

Course Name: Diploma in Electrical and Electronics EngineeringSubject Code: 4030652Semester: VISubject Title: BIO-MEDICAL INSTRUMENTATION PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instr	ructions	Examination		n	
4030652	TT	II /		Marks		
BIO-MEDICAL	Hours / Week	Hours / Semester	Internal	Board	Total	Duration
INSTRUMENTAT	/ Week	Semester	Assessment	Examinations	Iotui	
ION PRACTICAL	6	96	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

RATIONALE

Recent advances in the Medical Field have been fueled by the Instruments developed by the Electronics and Instrumentation Engineers. Pacemakers, Ultrasound Machine CAT, Medical Diagnostic Systems are few names which have been contributed by Engineers. Now the Healthcare Industry uses many Instruments which are to be looked after by Instrumentation Engineers.

OBJECTIVES

1. Will enable the Students to learn the basic principles of different Instruments/Equipment used in the Health HealthCare Industry.

2. The practical work done in this area will impart skill in the use, Servicing and Maintenance of this Instruments/Equipment.

3. Proficiency in this area will widen the knowledge and skill of Diploma Holders in the field of Biomedical Instrumentation.

DETAILED SYLLABUS

List of Experiments:

1. Construction and Testing of Differential amplifiers.

2. Construction and Testing of Instrumentation amplifiers.

3. Measurement of pH of given solution.

4.Measurement of Blood pressure

5.Measurement of ECG waveform.

6. Construction and verification of pacemaker circuit

7. Construction and testing of a high gain amplifier.

8. Measurement of Body and Skin temperature

9.Study, handle and use the following Instruments/Equipments:

- a. Cardiac monitor.
- b. ECG simulator.
- c. Muscle stimulator.
- d. Vascular Doppler recorder.
- e. Pressure plethysmograph.
- f. Skin sympathetic response meter
- g.

DETAILED ALLOCATION OF MARKS

Sl. No.	Name of the Activity	Marks Allocation
1	Circuit Diagram / Connection Diagram / Block Diagram	35
2	Connections and Proceeding the Experiment	35
3	Reading/Calculation/Graph/Result	25
4	Viva – voce	05
	TOTAL	100

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.NO	NAME OF THE EQUIPMENT	NO. OF QUANTITY
1	pH meter and conductivity meter	1
2	Photo transducer for pulse measurement	1
3	Sphygmomanometer and Stethoscope	1
4	Blood flow measurement system	1
5	Multi parameter (ECG, EMG, EEG) Simulator	1
6	GSR measurement setup.	1
7	Function generator	8
8	DSO	8
9	Regulated Power supplies	8
10	Bread boards	8

Course Name : Diploma in Electrical and Electronics Engineering Subject Code : 4030653 Semester : VI Subject title : COMPUTER HARDWARE AND NETWORKING PRACTICAL

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Inst	ructions	Examination			
4030653	Houng	Houng /	Marks			
COMPUTER		Fours /	Internal	Board	Total	Duration
HARDWARE AND	/ WEEK	Semester	Assessment	Examinations	Total	
NETWORKING PRACTICAL	6	96	40	100*	100	3 Hrs.

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

RATIONALE

The course aims at making the students familiar with various parts of computers and laptops and how to assemble them and the different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer and laptop software installation and maintenance and to make him diagnose the software faults. This subject also gives the knowledge and competency to diagnose the problems in computer hardware and peripherals and also gives the knowledge for trouble shooting for systematic repair and maintenance of computers and laptops.

OBJECTIVES

On completion of the following exercises, the students must be able to

- > Know the various indicators, switches and connectors used in Computers.
- > Familiarize the layout of SMPS, motherboard and various Disk Drives.
- Configure Bios setup options.
- ▶ Install various secondary storage devices with memory partition and formatting.
- > Know the various types of printer installation and to handle the troubleshooting
- > Assemble the PC system and check the working condition.
- ▶ Installation of Dual OS in a system.
- > Identify the problems in Computer systems, software installation and rectification
- > Assembling and disassembling the Laptop to identify the parts and to install the OS and configure it.
- > Enable to perform different cabling in a network.
- > Configure Internet connection and use utilities to debug the network issues.
- Configure router for any topology
- > Install and configure Windows 2008 / 2013 Server
- Design Windows server Active directory Services.
- > Install and configure server hardware devices.

DETAILED SYLLABUS

PART A - COMPUTER SERVICING AND NETWORK PRACTICAL

1	Identification of system layout (Study Exercise)
	a) From panel indicators & switches and from side & real side connectors.
	b) Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, HDD,
	DVD and add on cards.
	c) Configure bios setup program and troubleshoot the typical problems using BIOS utility.
	HARD DISK
	a) Install Hard Disk.

	b) Configure CMOS-Setup.
	c) Partition and Format Hard Disk.
	d) Identify Master /Slave / IDE Devices.
	e) Practice with scan disk, disk cleanup, disk Defragmentation, Virus Detecting and Rectifying
	Software.
3	a) Install and Configure a DVD Writer & Blu-ray Disc Writer.
3	b) Recording a Blank DVD & Blu-ray Disc.
4	Assemble a system with add on cards and check the working condition of the system and install
4	Dual OS.
	Identification of mobile phone components (Study Exercise)
5	a) Basic mobile phone components.
5	b) Familiarizing the basic circuit board components: Marking position of different IC and
	Switches in the Network and Power sections of the PCB
6	Flashing, Unlocking and Formatting memory cards in Mobile phones.
	Do the following cabling works in a network
	a) Cable Crimping
7	b) Standard Cabling
	c) Cross Cabling d) I/O Connector Crimping
	e) Testing the Crimped cable using a Cable tester
	a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN(TCP/IP
Q	Configuration).
0	b) Configure Internet connection and use IPCONFIG, PING / Tracert and Net stat utilities to
	Debug the Network issues.
0	Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and
9	share it in the network.
	PART B – SYSTEM ADMINISTRATION PRACTICAL
10	Installation of Windows 2008 / 2013 Server
11	Installation and configuration of DHCP Server.
12	Installation and configuration of Mail Server.
12	a) Installation of Red Hat Linux using Graphical mode.
15	b) Installation of Red Hat Linux using VMware.
14	a) Creating a user in Linux Server and assigning rights.
14	b) Configuring and troubleshooting.
15	a) Configuring and troubleshooting of /etc/grub.conf
15	b) Configuring and troubleshooting of /etc/passwd

Note:

The students must and should install software. After the demonstration, the same is uninstalled. Each batch has to learn to install and use the tools.

SI. No.	Name of the Activity	Marks Allocation
1	Procedure Writing – One Question from PART – A	10
2	Procedure Writing – One Question from PART - B	15
3	Executing Exercise $(PART - A)$	10
4	Executing Exercise (PART – B)	20
5	Result $(PART - A)$	5
6	Result $(PART - B)$	5
7	Demonstration of mini project	5
8	Viva – voce	5
	TOTAL	100

DETAILED ALLOCATION OF MARKS

Hardware Requirements:	
Desktop Systems	30 Nos
Hard disk drive	06 Nos
DVD, Blu-ray Drive	06 Nos
Blank DVD, Blu-ray Disc	20 Nos
Head cleaning CD	
Dot matrix Printer	02 Nos
Laser Printer	02 Nos
Server	01 Nos
Mobile phones	06 Nos
Network Requirements:	
Crimping Tool	06 Nos
Screwdriver set	06 Nos
Network Cables	
Modem	02 Nos
Hub	01 Nos
Router	01 Nos
Switch	02 Nos
Software Requirements:	
Windows OS	
Windows Server 2008 / 2013 and LINUX.	
Antivirus software.	
DVD and Blu-ray Burning S/W.	
Mobile Phone Flashing S/W	

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

Course Name	: Electronics and Electronics Engineering
Subject Code	: 4040660
Semester	: VI
Subject Title	: Project Work & Internship

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

	Subject	ubject Instructions			Examination			
Ē	Hours Hours / Marks		Marks					
	Project Work &	/ Week	Semester	Internal Assessment	Board Examinations	Total	Duration	
	Internship	6	96	40	100*	100	3 Hrs.	

*Examinations will be conducted for 100 marks and it will be reduced to 60 Marks.

Minimum Marks for Pass is 50 out of which minimum 50 marks should be obtained out of 100 marks in the Board Examination alone.

OBJECTIVES:

- The project work and internship is aimed to assemble and test a photo type model of any one item/gadget.
- Real time application problems if any may be identified from any industry and may be chosen.
- The knowledge and the skill so far acquired may be made use of.
- The team spirit may be motivated.
- The entrepreneurship ideas may be motivated by conducting a career guidance programme.

• Learn and understand the gap between the technical knowledge acquired through curriculum and the actual industrial need through internship

INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of Assessment	Period of Assessment	Max. Marks
First Review	6 th week	10
Second Review	12th week	10
Attendance	Entire semester	5
Total		25

EVALUATION FOR BOARD EXAMINATION:

Details of Mark Allocation	Max Marks
Demonstration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
Total	100