DIPLOMA IN ENGINEERING AND TECHNOLOGY

2

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

F – SCHEME

DRAFT SYLLABUS

IMPLEMENTED FROM 2020 – 2021

SESHASAYEE INSTITUTE OF TECHNOLOGY

(Autonomous)

TIRUCHIRAPPALLI – 620010

PREFACE

The wave of liberalization and globalization has created an environment for free flow of information and technology through fast and efficient means the world over. This has lead to shrinking of world, bringing people from different cultures and environment together, giving rise to a global village. A shift has been taking place in India from closed economy to knowledge based and open economy. In order to cope-up with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate knowledge, professional skills and attitude. Technical education system is one of the significant components for human resource development. **Polytechnics** play an important role in meeting the requirements of trained technical manpower for industries and field organizations. The initiatives being taken by the State Board of Technical Education, Tamilnadu to revise the curriculum of existing diploma programmes as per the needs of the industry are laudable.

In order to meet the requirements of future technical manpower, constant efforts have to be made to identify new employment opportunities, carryout activity analysis and design need based curricula of diploma programmes. This curriculum document has been designed by identifying job potential and competency profile of diploma holders leading to identification of curriculum areas for the course.

It is needless to emphasize that the real success of the diploma programme depends upon its effective implementation. This will require harnessing and effective utilization of resources. In addition to acquisition of appropriate physical resources, the availability of competent and qualified faculty is essential.

It is time for the managers of technical education system to reorganize the system to accept the challenges of both quantitative and qualitative expansion of technical education. The creation of EDUSAT facilities in the country must be exploited to its fullest extent to reap the benefits of interactive electronic media for teaching-learning process.

It is hoped that polytechnics will carry out job market research on a continuous basis to identify the new skill requirements and develop innovative methods of course offering and thereby infuse dynamism in the system.

Principal

Seshasayee Institute of Technology

ACKNOWLEDGEMENT

We gratefully acknowledge the assistance and guidance received from the following persons:

i) Commissioner Technical Education and Special Officer Curriculum Development centre, DOTE, Chennai for taking keen interest and support in the design of this curriculum.

ii) Programme Advisory Committee members :

Mr.S.DHARMASELVAN, Joint Director / MSME, Chennai

Dr.K.DHAYALINI, Professor and Head / EEE, K.Ramakrishnan College Of Engineering and Technology, Trichy

Mr.J.SENTHIL NATHAN, HOD/EEE, Government Polytechnic College, Trichy,

Mr.T.R.LAKSHMI NARASIMMAN, Head Business Development, Large Motors and Drives Applns, SIEMENS Ltd., Thane.

for their professional inputs and guidance in execution of the Curriculum and syllabus.

iii) Principal of this Institute for his Guidance and Academic freedom provided to the Department in design of this curriculum.

iv) All the faculty members from Department of Electrical and Electronics Engineering for their untiring assistance and support in curriculum design and documentation.

Coordinator

CONTENTS

1. Department Vision, Mission, PEO and PO

Vision

To meet the challenges of new technological advances and to provide update knowledge in the state of the art technology, re-orientation and up gradation of the curriculum to the level of industry relevant learning and training and thus to be a premier technical department that strives continuously for excellence in education

Mission

- To produce Electrical Engineers of high Caliber to serve the Society and Nation.
- To bridge the gap between industry and academic by framing curriculum and syllabus based on industrial needs
- To create and sustain environment of learning in which students acquire knowledge and learn to apply it professionally with due consideration of social and economical issues.
- To provide opportunity to enhance the creative talents of students and faculty members
- To inculcate moral and ethical values among the faculty and students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Electrical and Electronics Engineering programme of Seshasayee Institute of Technology will prepare its diploma students

PEO1: To have fundamental and broad knowledge in Electrical and Electronics Engineering

PEO2: To apply creatively their understanding of engineering principles to the Solution of problems arising in whatever career they choose

PEO3: To communicate their ideas and positions clearly and concisely

PEO4: To practice their Professions conforming to Ethical Values and Environmental friendly policies

PEO5: To work as a team in multi-cultural and multi-disciplinary Environments

PEO6: To adapt evolving Technologies, innovations and stay current with their Professions

PROGRAMME OUTCOMES (POs)

Students of Diploma in Electrical and Electronics Engineering course at our institute will be

PO1: Able to identify, analyze and provide solutions to problems in the field of Electrical and Electronic Engineering

PO2: Able to adopt energy conservation and renewable energy in order to promote eco- friendly electrical energy production

PO3: Able to communicate effectively in order to compete globally

PO4: Able to handle any situation with ethical and social responsibility

PO5: Able to work as an individual and as a team member in multi-cultural and multi-disciplinary Environments

PO6: Able to apply modern techniques and IT tools in Engineering

2. R E G U L A T I O N S

DIPLOMA COURSES IN ENGINEERING
(TERM PATTERN)
(Implemented from 2020- 2021)
F– SCHEME
(Common to all Programmes)

Description of the Course:

a. Full Time (3 years)
The Programme for the Full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 terms* and the First Year is common to all Engineering Branches.

b. Sandwich (3½ years)
The Course for the Sandwich Diploma in Paper Technology shall extend over a period of three and half academic years, consisting of 7 terms* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience. During 4th and/or during 7th term the students undergo industrial training for six months. Industrial training examination will be conducted after completion of every 6 months of industrial training.

** Each term will have 16 weeks duration of study with 35 hrs. / Week for Regular Diploma Courses.*

Condition for Admission:

Condition for admission to the Diploma courses shall be required to have passedin The S.S.L.C Examination of the Board of Secondary Education, Tamil Nadu. (Or)

The Anglo Indian High School Examination with eligibility for Higher SecondaryCourse in Tamil Nadu. (Or)

The Matriculation Examination of Tamil Nadu. (Or)

Any other Examinations recognized as equivalent to the above by the Board of Secondary Education, Tamil Nadu.

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.

Admission to Second year (Lateral Entry):

A pass in HSC (academic) or (vocational) courses mentioned in the Higher Secondary Schools in Tamil Nadu affiliated to the Tamil Nadu Higher Secondary Board with eligibility for University Courses of study or equivalent examination & Should have studied the following courses.

A pass in 2 Years ITI with appropriate Trade or Equivalent examination.

SN	Courses	H.Sc Academic	H.Sc Vocational		Industrial Training Institutes Courses
		Studied any three of the following subjects	Subjects Studied		
			Studied any three of the following subjects	Vocational subjects	
1.	All the Regular and Sandwich Diploma Courses	• Maths • Physics • Chemistry • Computer Science • Electronics • Information Technology • Biology • Informatics Practices • Bio Technology • Technical Vocational subject • Agriculture • Engineering Graphics • Business Studies • Entrepreneurship	• Maths • Physics • Chemistry • Computer Science • Electronics • Information Technology • Biology • Informatics Practices • Bio Technology • Technical Vocational subject • Agriculture • Engineering Graphics • Business Studies • Entrepreneurship	Related Vocational Subjects Theory& Practical	2 years course to be passed with appropriate Trade

- For the Diploma Programmes related with Engineering/Technology, the related / equivalent courses prescribed along with Practical's may also be taken for arriving the eligibility.
- Programmes will be allotted according to merit through counselling by the Principalas per communal reservation.
- Candidates who have studied Commerce Courses are not eligible for EngineeringDiploma Programmes.

Age Limit: No Age limit.

Medium of Instruction:English

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 3/3 ½ academic years (Full Time/Sandwich), affiliated to the State Board of Technical Education and Training, Tamil Nadu, when joined in First Year and 2/2 ½ years (Full Time/Sandwich), if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Programmes are given below:

Diploma Programmes	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Sandwich (Lateral Entry)	2½ Years	5½ Years

This will come into effect from F Scheme onwards i.e. from the academic year 2020-2021.

Programmes of Study and Curriculum outline

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

The curriculum outline is given in Annexure – I.

Examinations:

Autonomous Examinations in all Programmes of all the terms under the schemeof examinations will be conducted at the end of each term.

The internal assessment marks for all the courses will be awarded on the basis of continuous assessment earned during the term concerned. For each course, 25 marks are allotted for internal assessment. Autonomous Examinations areconducted for 100 marks and reduced to 75.

The total marks for result are 75 + 25 = 100 Marks.

Continuous Internal Assessment:

A. For Theory Courses:

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

i) Course Attendance : 5 Marks

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

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

ii) Test # 10 Marks

Two Tests each of 2 hours duration for a total of 50 marks are to be conducted.Average of these two test marks will be taken and the marks to be reduced to: 05 Marks

The Test – III is to be the Model Examination covering all the five units and the marks obtained will be reduced to: 05 Marks

Test	Units	When To Conduct	Marks	Duration
Test I	Unit – I & Half of Unit II	End of 6th week	50	2 Hrs
Test II	Remaining Half of Unit II & III	End of 12th week	50	2 Hrs
Test III	Model Examination: Covering all the 5 Units. (Autonomous Examinations-Question paper-pattern).	End of 16th week	100	3 Hrs

 # From the Academic Year 2020 – 2021 onwards.

Question Paper Pattern for the Cycle Test :(Test - I & Test- II) **:**

Part A Type questions (Any 4 out of 6 questions):

4 Questions × 2 mark 08 marks

Part B Type questions (Any 4 out of 6 questions):

4 Questions × 3 marks 12 marks

Part C Type questions (Either or):

3 Questions ×10 marks 30 marks

Total 50 marks

iii) Assignment :10 Marks

a.	**Written Assignment**	**- 4 marks**
b.	**Multiple Choice Questions**	**- 3 marks**
c.	**Seminar Presentation**	**- 3 marks**
	Total	**- 10 Marks**

a. Written Assignment : 4 Marks

For each course Two Assignments are to be given each for 10 marks and the average marks scored should be reduced for 4 marks.

b. Multiple Choice Questions : 3 Marks

For each course one MCQ test are to be given for 30 marks and the marks scored should be reduced for 3 marks.

c. Seminar Presentation : 3 Marks

The students have to select the topics either from their course or general courseswhich 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 theseminar 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 individually.) The seminar presentation is mandatory for all

theory courses and carries 3 marks for each theory course. The respective coursefaculty may suggest topics to the students and will evaluate the submitted materials and seminar presentation. (1 ½ marks for the material submitted in writing and 1 ½ marks for the seminar presentation). For each subject minimum oftwo seminars are to be given and the average marks scored should be reduced to3 marks.

All Test Papers, Assignment Papers / Notebooks and the seminar presentation written material after getting the signature with date from the students must be keptin safe custody in the department for verification and audit. It should be preservedfor one term 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 25 marks which are to be distributed as follows:-

a) **Attendance** **: 5 Marks**
(Award of marks same as theory subjects)

b) **Procedure/ observation and tabulation/**
Other Practical related Work **: 10 Marks**

c) **Record writing** **: 10 Marks**

d) **TOTAL** **: 25 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 10 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 10 marks for eachexercise as per the above allocation.
- At the end of the term, the average marks of all the exercises should be calculatedfor 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 Practical. (20+5=25 marks)
- Only regular students, appearing first time have to submit the duly signed bonafiderecord 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.

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 theCommunication 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.

Project Work and Internship:

The students of all the Diploma Programme have to do a Project Work as part of the Curriculum and in partial fulfilment for the award of Diploma by the State Boardof Technical Education and Training, Tamil Nadu. In order to encourage studentsto do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. The Project work must be reviewed twice in the same term. The project work is approved duringthe V term by the properly constituted committee with guidelines.

a) Internal assessment mark for Project Work & Internship:

Project Review I	**…**	**10 marks**
Project Review II	**…**	**10 marks**
Attendance	**…**	**05 marks** (Award of marks same as theory subject pattern)
TOTAL	**…**	**25 MARKS**

Proper record should be maintained for the two Project Reviews and preserved forone term after the publication of Board Exams results. It should be produced to theflying 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 75 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 term 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 Centres / 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.

Scheme of Examinations:

The Scheme of examinations for courses is given in Curriculum outline

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 State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a course 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 Autonomous Examinations marks put together, course to thecondition that he/she secures at least a ***minimum of 40 marks out of 100 marksin the Autonomous Theory Examinations and a minimum of 50 marks out of100 marks in the Autonomous Practical Examinations***.

Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2023 onwards (Joined first year in 2020 -2021) 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 courses and passes all the terms in the first appearance itself and passes all courses withinthe stipulated period of study 2 / 3 / 3½ years [Full time (lateral entry)/Full Time/Sandwich] 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 terms put together and passes all the terms except the I and II term in the first appearance itself and passes all courses within the stipulated period of study 2 / 3 / 3½ years[Full time(lateral entry)/Full Time/Sandwich] 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 terms put together and passes allthe courses within the stipulated period of study 2 / 3 / 3½ years [Full time(lateral entry)/Full Time/Sandwich] 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 Sandwich students who passout Final Examination from October 2023 /April 2024 onwards (both joined First Year in 2020 -2021).

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).

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3. SALIENT FEATURES

Name of the Programme	:	Diploma Programme in Electrical and Electronics Engineering
Duration of the Programme	:	Three years (Six Semesters)
Entry Qualification	:	Matriculation or equivalent as prescribed by State Board of Technical Education,Tamilnadu
Intake	:	60
Pattern Of the Programme	:	Term (Semester) Pattern
Ratio Between Theory & Practical Classes	:	50 : 50 (Approximately)

4. EMPLOYMENT OPPORTUNITIES FOR DIPLOMA HOLDERS IN ELECTRICAL AND ELECTRONICS ENGINEERING

It is observed that employment in government/public sector undertakings are dwindling day by day. Keeping present scenario in view, following employment opportunities are visualized in different sectors of employment for diploma holders in electrical and electronics engineering.

4.1 Manufacturing Industry (Mechanical)

The Electrical diploma holder will be involved in following activities in mechanical manufacturing industry:

- Planning and execution for Electrical installation
- Distribution of Electrical Power
- Maintenance of Industrial Electrical System
- Repair and Maintenance of Electrical Machines and Equipment
- Repair and Maintenance of Electronic Control Circuitry
- Testing and Standardization for Quality Control
- Energy Conservation

4.2 Manufacturing Industry (Electrical and Electronics)

The Electrical diploma holder will be involved in following activities in Electrical and Electronics manufacturing industry:

- Assistance in Research and Development
- Assistance in Planning, Designing and Detailing
- Shop-floor Management including Quality Control
- Power Generation and Distribution
- Installation of Electrical Power Supply Systems
- Maintenance of Electrical and Electronic System(s)
- Repair and Maintenance of Electrical Machines/Equipment (including testing)
- Production
- Inventory Management
- Marketing and Sales

4.3 Government Departments such as Electricity Board, MES, PWD, Railways, Air bases, Airports, Defence, Thermal, Hydro and Nuclear Power Stations and other Boards and Corporations.

The Electrical diploma holder will be involved in following type of activities in above mentioned Government Departments:

- Assistance in Planning and Design of Electrical generation, transmission, distribution and protection system including testing, quality control
- Estimating for electrical installation Construction, erection and commissioning of lines and Sub-stations
- Electrical Safety measures
- Operation and Maintenance of Lines and Sub-stations/underground cables
- Tariffs and Calculations of bills for consumption of electricity
- Inventory Management
- Repair and Maintenance of Electrical Machines/ Equipment
- Operation and maintenance of Thermal, Hydro and Nuclear Power Stations

4.4 Hospitals, Commercial Complexes, Service Sector Organizations like Hotels, Tourist-Resorts, high-rise buildings, Cinema/Theater Halls etc. Diploma holder in electrical engineering will be involved in following type of activities in above mentioned Service Sector Organizations:

- Layout of wiring circuit, planning and execution for Electrical Installation
- Standby or captive Power Generation and its Distribution
- Maintenance of Electrical and Electronic Equipment
- Preventive Maintenance of Communication System, Lifts, Air-Conditioning
- Plants and Water Supply System
- Inventory Management
- Estimation for electrical repair and maintenance work

4.5 Self Employment

Following type of self employment opportunities are available to the diploma holder in electrical engineering:

- Trading of Electrical Goods
- Establishing Repair and Maintenance Unit/ Centre
- Free Lancer for Repair and Maintenance of House-hold Electrical and Electronic Gadgets such as: Washing Machines, Geysers, Air Conditioners, Coolers and electrical installations etc.
- Electrical contractor
- Motor Winding Unit
- Auto-electrical Work
- Service sector

Can work as:

- Service and marketing engineer in the field of automation.
- Trainer of PLC & SCADA system.
- TSE (Technical Support Executive)

4.6 JOB PROFILE/ ACTIVITY PROFILE

(01) Reading and interpreting drawings related to electrical machines, equipment, wiring installations
(02) Selecting right kind and quality of materials
(03) Using measuring instruments, tools and testing devices for varied field applications
(04) Understanding of constructional details, principle of working, characteristics and application of electrical machines, equipment, appliances and instruments
(05) Understanding of salient features and working principles of generation, transmission, distribution, protection and utilization of electrical power in different sectors
(06) Understanding of practices involved in erection, testing/installation and commissioning of electrical machines, equipment, control panels and systems
(07) Troubleshooting of electrical machines, wiring installations, equipment and control systems
(08) Knowledge and awareness of: Power Tariff (Power Trade and Control), Indian Electricity rules, codes and Standards, Electrical Safety and Shock Prevention Measures ,Labour Management,
(09) Understanding of safety practices such as earthing, fire and shock prevention measures adopted in industry and service sector
(10) Understanding the principles of basic and digital electronics, microprocessors and micro-controller based systems and their applications in electrical control circuits
(11) Uses Information Technology and computers for various applications in the field of electrical engineering
(12) Knowledge and awareness of upcoming technologies of their field like PLC,SCADA & DCS System
(13) Good knowledge of Electrical AutoCAD.
(14) Competencies in supervising shop floor/ work site operations
(15) Awareness about the environment, use of non-conventional energy sources, external financial and technical support system, and energy conservation techniques
(16) Knowledge of latest trends in the field of electronic controls, communication and instrumentation

5. COMPETENCY PROFILE OF DIPLOMA HOLDER IN ELECTRICAL AND ELECTRONICS ENGINEERING

Keeping in view the employment scenario and requirement of four domains of learning viz. Professional Development Domain, Continued Learning Domain, Human Relations Domain and Personal Development Domain, a diploma holder in Electrical and Electronics Engineering should have the:

(01) Understanding of constructional details, principle of working, characteristics and application of electrical machines, equipment, appliances and instruments

(02) Understanding of salient features and working principles of generation, transmission, distribution, protection and utilization of electrical power in different sectors

(03) Ability to read and interpret drawings related to sub stations, electrical machines, equipment, wiring installations for light and power.

(04) Competency in selection of right kind and quality of materials and preparation of estimates for installation of control panels used in industry.

(05) Ability to prepare tender document as per given drawings.

(06) Ability to use measuring instruments, tools and testing devices for varied field applications.

(07) Competency in the design of control circuits for electrical machine control, Control panels, wiring circuits etc.

(08) Ability to draw Ladder diagram and write Program for Control of Machines using PLC.

(09) Understanding of practices involved in erection, testing/installation and commissioning of electrical machines, equipment, control panels and systems.

(10) Ability for fault diagnosis and repair of electrical machines, wiring installations, equipment and control systems.

(11) Knowledge and awareness of:

- Power Tariff (Power Trade and Control)
- Indian Electricity rules, codes and Standards
- Safety and Shock prevention Measures
- Labour Management
- Technical Report-writing Skills
- Team Working, Interpersonal Relations and Human Values
- Entrepreneurship Development (Self Employment)
- Concern for wastage

(12) Understanding of safety practices such as earthing, fire and shock prevention measures adopted in industry and service sector

(13) Understanding the principles of basic and digital electronics, micro processors and micro- controller based systems and their applications in electrical control circuits.

(14) Ability to use Information Technology and computers for various applications in the field of electrical engineering.
(15) Knowledge of applied and engineering sciences for better comprehension of technologies used in electrical industry and service sector and to develop scientific temper, analytical skills and to facilitate continuing education.
(16) Competencies in general, manual and machining skills for supervising shop floor/ work site operations
(17) Proficiency in oral and written communication, technical report writing, managing relationship with juniors, pears and seniors for effective functioning in the world of work
(18) Competency in solving simple problems related to various functional areas of electrical and electronics engineering may it be prototype development, diagnostic and fault finding or repair and maintenance of plant and equipment
(19) Understanding of basic principles of managing men, material and equipment and techniques of achieving economy and quality
(20) Awareness about the environment, use of non-conventional energy sources, external financial and technical support system, adopting energy conservation techniques
(21) Knowledge of latest trends in the field of electronic controls, communication and instrumentation.

6. CURRICULAM OUTLINE :

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10													
TEACHING AND EXAMINATION SCHEME													
PROGRAMME : ELECTRICAL AND ELECTRONICS ENGINEERING								TERM : III					
DURATION : 16 WEEKS								SCHEME : F WITH EFFECT FROM : 2020 - 2021					
SN	Course Code	Course Title	Abbreviation	Teaching Scheme				Credits	Scheme Of Examination				
				Theory	Tutorial	Practical	Total		Internal	End Exam *	Total	Min. Marks For Pass	Duration
1	2F3201	Electrical Circuit Theory	ECT	5	---	---	5	5	25	100	100	40	3
2	2F3202	Electrical Machines – I	EM-1	5	---	---	5	5	25	100	100	40	3
3	2F3203	Electronic Devices & Circuits	EDC	5	---	---	5	5	25	100	100	40	3
4	2F3204	Measurements & Instrumentation	MI	4	---	---	4	4	25	100	100	40	3
5	2F3205	Electrical Circuits and Machines Lab	ECML	---	1	4	5	3	25	100	100	50	3
6	2F3206	Electronic Devices & Circuits Lab	EDCL	---	---	4	4	2	25	100	100	50	3
7	2F3207	Electrical Workshop	EWP	---	---	4	4	2	25	100	100	50	3
	TOTAL			19	1	12	32	26	175	525	700		
	Extra / Co-Curricular activities												
	Library		LIB				1						
	Physical Education		PTE				2						
	TOTAL			19	1	12	**35**						

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10														
TEACHING AND EXAMINATION SCHEME														
PROGRAMME : ELECTRICAL AND ELECTRONICS ENGINEERING													TERM : IV	
DURATION : 16 WEEKS							SCHEME : F			WITH EFFECT FROM : 2020 - 2021				
SN	Course Code	Course Title	Abbreviation	Teaching Scheme				Credits	Scheme Of Examination					
				Theory	Tutorial	Practical	Total		Internal	End Exam *	Total	Min. Marks For Pass	Duration	
1	2F4301	Electrical Machines – II	EM-2	5	---	---	5	5	25	100	100	40	3	
2	2F4302	Analog & Digital Electronics	ADE	5	---	---	5	5	25	100	100	40	3	
3	2F4303	Energy Conservation And Audit	ECA	5	---	---	5	5	25	100	100	40	3	
4	2F4401	E – Vehicle Technology & Policy	EVP	4	---	---	4	4	25	100	100	40	3	
5	2F4304	Electrical Machines and Instrumentation Lab	EMIL	---	1	4	3	3	25	100	100	50	3	
6	2F4305	Analog & Digital Electronics Lab	ADEL	---	---	4	2	2	25	100	100	50	3	
7	2F4306	CAD & Simulation Lab	CSL	---	---	4	2	2	25	100	100	50	3	
	TOTAL			19	1	12	32	26	175	525	700			
	Extra / Co-Curricular activities													
	Library		LIB				1							
	Physical Education		PTE				2							
	TOTAL			19	1	12	35							
8	2F0006	Universal Human Values	UHV**					5	25	100	100	40	3	

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10													
TEACHING AND EXAMINATION SCHEME													
PROGRAMME : ELECTRICAL AND ELECTRONICS ENGINEERING TERM : V													
DURATION : 16 WEEKS SCHEME : F WITH EFFECT FROM : 2020 - 2021													
S N	Course Code	Course Title	Abbreviation	Teaching Scheme				Credits	Scheme Of Examination				
				Theory	Tutorial	Practical	Total		Internal	End Exam *	Total	Min. Marks For Pass	Duration
1	2F5307	Power System – I	PS-1	5	---	---	5	5	25	100	100	40	3
2	2F5308	Control & Maintenance of Electrical Machines	CEM	5	---	---	5	5	25	100	100	40	3
3	2F5402.1	Micro Controller	MC	4	---	---	4	4	25	100	100	40	3
	2F5402.2	VLSI Design	VLSI										
	2F5402.3	Renewable Energy Sources & Energy Auditing	RESA										
4	2F5309	Wiring, Estimation &Winding Lab	WEW	---	1	4	5	3	25	100	100	50	3
5	2F5310	Control & Maintenance of Electrical Machines Lab	CEML	---	1	4	5	3	25	100	100	50	3
6	2F5403.1	Micro Controller Lab	MCL	---	---	4	4	2	25	100	100	50	3
	2F5403.2	VLSI Design Lab	VLSIL										
	2F5403.3	Renewable Energy Sources & Energy Auditing Lab	RESL										
7	2F5404	Entrepreneurship and start up	ESU	2	---	2	4	3	25	100	100	50	3
	TOTAL			16	2	14	32	25	175	525	700		
	Extra / Co-Curricular activities												
	Library		LIB				1						
	Physical Education		PTE				2						
	TOTAL			16	2	14	35						
8	**2F0005**	**Concurrent Career Development**	**CCD**					**5**	**25**	**100**	**100**	**40**	**3**

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

**The total hours allotted for taking UHV is 75 Hrs and will be handled with flexible timings

SESHASAYEE INSTITUTE OF TECHNOLOGY(AUTONOMOUS),TRICHY-10														
TEACHING AND EXAMINATION SCHEME														
PROGRAMME : ELECTRICAL AND ELECTRONICS ENGINEERING													TERM : VI	
DURATION : 16 WEEKS				SCHEME : F							WITH EFFECT FROM : 2020 - 2021			
S N	Course Code	Course Title	Abbreviation	Teaching Scheme				Credits	Scheme Of Examination					
				Theory	Tutorial	Practical	Total		Internal	End Exam *	Total	Min. Marks For Pass	Duration	
1	2F6311	Power System - II	PS2	5	---	---	5	5	25	100	100	40	3	
2	2F6312	Power Electronics	PE	5	---	---	5	5	25	100	100	40	3	
3	2F6405.1	Programmable Logic Controller	PLC	5	--	---	5	5	25	100	100	40	3	
	2F6405.2	Bio-Medical Instrumentation	BMI											
	2F6405.3	Computer Hardware & Networking	CHN											
4	2F6313	Power Electronics Lab	PEL	---	---	6	6	3	25	100	100	50	3	
5	2F6406.1	Programmable Logic Controller Lab	PLCL	---	---	5	5	2	25	100	100	50	3	
	2F6406.2	Bio-Medical Instrumentation Lab	BMIL											
	2F6406.3	Computer Hardware & Networking Lab	CHNL											
6	2F6407	Project Work & Internship	PWI	---	---	6	6	3	25	100	100	50	3	
	TOTAL			15	---	17	32	23	175	525	700			
	Extra / Co-Curricular activities													
	Library		LIB				1							
	Physical Education		PTE				2							
	TOTAL			15	--	17	35							

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

7. DERIVING CURRICULUM AREAS/SUBJECTS DERIVED FROM COMPETENCY PROFILE

Sl.No.	Competency Profile	Curriculum Areas
1.	Ability to read and interpret drawings related to sub stations, electrical machines, equipment, wiring installations for light and power,	✓ Basic Graphic and Drawing Skills ✓ Wiring circuits ✓ CAD drawing
2.	Ability to use measuring instruments, tools and testing devices for varied field applications	✓ Measurements and Instrumentation ✓ Electrical and Electronics Practicals
3.	Competency in the design of control circuits for electrical machine control, control panels, wiring circuits etc.	✓ Control and Maintenance of Electrical Machines ✓ Electrical Workshop Practice
4.	Understanding of constructional details, principle of working, characteristics and application of electrical machines, equipment, appliances and instruments	✓ Electrical Machines ✓ Utilization of Electrical Energy (Power System)
5.	Understanding of salient features and working principles of generation, transmission, distribution, protection and utilization of electrical power in different sectors	✓ Transmission and Distribution of Electrical Power ✓ Generation and Protection of Electrical Power
6.	Understanding of practices involved in erection/installation and commissioning of electrical machines, equipment, control panels and systems	✓ Erection Commissioning and operation of Electrical Machines and Installations
7.	Ability for fault diagnosis and repair of electrical machines, wiring installations, equipment and control systems	✓ Testing, repair and maintenance of Electrical Machines and Installations
8.	Competencies in general, manual and machining skills for supervising shop floor / work site operations Understanding of safety practices such as earthing, fire and shock prevention measures adopted in industry and service sector	✓ Electrical Workshop Practice

Sl.No.	Competency Profile	Curriculum Areas
9.	Competency in selection of right kind and quality of materials and preparation of estimates for installation of control panels used in industry	✓ Electrical Engineering Drawing ✓ Estimation and Costing
10.	Ability to prepare tender document as per given drawings	✓ Electrical Estimation and Costing
11.	Understanding the principles of basic and digital electronics, microprocessors and micro-controller based systems and their applications in electrical control circuits	✓ Digital Electronics ✓ Programmable Logic Controllers (PLCs) ✓ Microcontrollers
12.	Ability to use Information Technology and computers for various applications in the field of electrical engineering and Programming skill	✓ C++ Programming ✓ CAD & Simulation ✓ Computer Networks
13.	Knowledge of applied and engineering sciences for better comprehension of technologies used in electrical industry and service sector and to develop scientific temper, analytical skills and to facilitate continuing education	✓ Engineering Physics ✓ Engineering Chemistry ✓ Applied Mathematics ✓ Workshop Practice
14.	Proficiency in oral and written communication, technical report writing, managing relationship with juniors, pears and seniors for effective functioning in the world of work	✓ Communication Skills ✓ Project Work ✓ Exposure to World of Work ✓ Industrial Training
15	Competency in solving simple problems related to various functional areas of electrical engineering may it be prototype development, diagnostic and fault finding or repair and maintenance of plant and equipment	✓ Control and Maintenance of Electrical equipments ✓ Estimation and
.16	Awareness about the environment, use of non- conventional energy sources, external financial and technical support system, adopting energy conservation techniques	✓ Environmental Education ✓ Renewable (Non-Conventional) Sources of Energy

8. HORIZONTAL AND VERTICAL ORGANISATION OF THE COURSES

SN.	Subject	Distribution of credits in various Terms					
		I	II	III	IV	V	VI
1.	Electrical Circuit Theory	-	-	5	-	-	-
2.	Electrical Machines-I	-	-	5	-	-	-
3.	Electronic Devices & Circuits	-	-	5	-	-	-
4.	Measurements & Instrumentation	-	-	4	-	-	-
5.	Electrical Circuits and Machines Lab	-	-	3	-	-	-
6.	Electronic Devices & Circuits Lab	-	-	2	-	-	-
7.	Electrical Workshop	-	-	2	-	-	-
8	Electrical Machines – II	-	-	-	5	-	-
9	Analog & Digital Electronics	-		-	5	-	-
10	Energy Conservation And Audit	-		-	5	-	-
11	E – Vehicle Technology & Policy	-		-	4	-	-
12	Electrical Machines and Instrumentation Lab	-		-	3	-	-
13	Analog & Digital Electronics Lab			-	2	-	-
14	CAD & Simulation Lab			-	2	-	-
15	Concurrent Career Development			-	5	-	-
16	Power System – I			-	-	5	
17.	Control & Maintenance of Electrical Machines	-	-	-	-	5	-
18	Elective – I Theory	-	-	-	-	4	-
19	Control & Maintenance of Electrical Machines Lab	-	-	-	-	3	-
20	Wiring, Estimation & Winding Lab	-	-	-	-	3	-
21	Elective – I Practical	-	-	-	-	2	-
22	Entrepreneurship and start up	-	-	-	-	3	-

23	Universal Human values	-	-	-	-	5	-
24	Power System - II	-	-	-	-	-	5
25	Power Electronics	-	-	-	-	-	5
26	Elective – II Theory	-	-	-	-	-	5
27	Power Electronics Lab	-	-	-	-	-	3
28	Elective –II Practical	-	-	-	-	-	2
29	Project work & Internship	-	-	-	-	-	3
	Total			26	31	30	23

Total Credits = First year 60 credits + programme 110 credits
= 170 credits

EQUIVALENT PAPERS

OF

E SCHEME COURSES

TO

F SCHEME COURSES

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EQUIVALENT PAPERS

OF E SCHEME COURSES TO F SCHEME COURSES

III TERM

E-SCHEME		F-SCHEME	
Course Code	**Course Title**	**Course Code**	**Course Title**
2E3201	Electrical Circuit Theory	2F3201	Electrical Circuit Theory
2E3202	Electrical Machines – I	2F3202	Electrical Machines – I
2E3203	Electronic Devices & Circuits	2F3203	Electronic Devices & Circuits
2E3401	C++ Programming	---	No Equivalent Paper
2E3204	Electrical Machines-I Lab	2F3205	Electrical Circuits and Machines Lab
2E3205	Electronic Devices & Circuits Lab	2F3206	Electronic Devices & Circuits Lab
2E3402	C++ Programming Lab	---	No Equivalent Paper

IV TERM

E-SCHEME		F-SCHEME	
Course Code	**Course Title**	**Course Code**	**Course Title**
2E4301	Electrical Machines – II	2F4301	Electrical Machines – II
2E4302	Analog & Digital Electronics	2F4302	Analog & Digital Electronics
2E4206	Measurements & Instrumentation	2F3204	Measurements & Instrumentation (III Term)
2E4303	Electrical Machines-II Lab	2F4304	Electrical Machines and Instrumentation Lab
2E4304	Analog & Digital Electronics Lab	2F4305	Analog & Digital Electronics Lab
2F4207	Electrical Workshop	2F3207	Electrical Workshop (III Term)
2E4207	Life &Employability skill Practical	---	No Equivalent Paper

V TERM

E-SCHEME		F-SCHEME	
Course Code	**Course Title**	**Course Code**	**Course Title**
2E5306	Power System – I	2F5307	Power System – I
2E5307	Control & Maintenance of Electrical Machines	2F5308	Control & Maintenance of Electrical Machines
2E5403.1	Microcontroller	2F5402.1	Micro Controller
2E5403.2	VLSI Design	2F5402.2	VLSI Design
2E5403.3	Electrical Machine Design	---	No Equivalent Paper
2E5308	Control & Maintenance of Electrical Machines Lab	2F5310	Control & Maintenance of Electrical Machines Lab
2E5309	Wiring, Winding & Estimation Lab	2F5309	Wiring, Estimation &Winding Lab
2E5404.1	Microcontroller Lab	2F5403.1	Micro Controller Lab
2E5404.2	VLSI Design Lab	2F5403.2	VLSI Design Lab
2E5404.3	Electrical Machine Design Lab	---	No Equivalent Paper
2E5405	CAD & Simulation Lab	2F4306	CAD & Simulation Lab (IV Term)

VI TERM

E-SCHEME		F-SCHEME	
Course Code	**Course Title**	**Course Code**	**Course Title**
2E6310	Power System - II	2F6311	Power System - II
2E6311	Power Electronics	2F6312	Power Electronics
2E6312	Renewable Energy Sources & Energy Auditing	2F5402.3	Renewable Energy Sources & Energy Auditing (V Term)
2E6406.1	Programmable Logic Controller	2F6405.1	Programmable Logic Controller
2E6406.2	Bio-Medical Instrumentation	2F6405.2	Bio-Medical Instrumentation
2E6406.3	Computer Hardware & Networking	2F6405.3	Computer Hardware & Networking
2E6313	Power Electronics Lab	2F6313	Power Electronics Lab
2E6407.1	Programmable Logic Controller Lab	2F6406.1	Programmable Logic Controller Lab
2E6407.2	Bio-Medical Instrumentation Lab	2F6406.2	Bio-Medical Instrumentation Lab
2E6407.3	Computer Hardware & Networking Lab	2F6406.3	Computer Hardware & Networking Lab
2E6408	Project Work	2F6407	Project Work & Internship

Detailed Content of Various Courses

TERM - III

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS
F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3201 Term : III

Course Name : ELECTRICAL CIRCUIT THEORY

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3201	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Electrostatics and D.C. Circuits	15
II	Network Theorems	14
III	Single phase A.C Circuits	15
IV	Parallel Circuits & Resonance	14
V	Three phase A.C. Circuits	15
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

Study of Electric Circuits is an essential in study of Electrical and Electronics Engineering. The subject forms the foundation of Electrical and Electronics Engineering. It prepares the students to familiarize with basic concepts and principles of electrical circuits. Study of Circuits and Network constitutes the basic and fundamental aspect of deriving insight into the functioning and analysis of Electrical network, instruments and machineries.

OBJECTIVES

At the end of this course, students will be able to

- Understand the fundamentals of Electrostatics
- Apply Kirchhoff's current and voltage laws and Ohm's law to circuit problems
- Simplify circuits using series and parallel equivalents
- Perform Network analysis and other solving techniques for DC circuits
- Solve circuit problems using Theorems
- Perform Network analysis and other solving techniques for DC circuits.
- Understand the basic knowledge on single phase and three phase A.C circuits
- Develop knowledge on RLC series and parallel resonance
- Understand the basic knowledge on three phase balanced A.C circuits

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**D.C. Circuits and Electrostatics** **1.1 D.C. Circuits:** Basic Concept of current, e.m.f, potential difference, Resistance - Resistivity, temperature coefficient of resistance - Resistances in series - Resistances in parallel. - Power and energy – Relationship between electrical, mechanical and Thermal units. Ohm‘s law - applications of Ohm‘s law - series and parallel circuits - Kirchoff‘s laws - Kirchoff’s Current Law - Kirchoff’s Voltage Law - Simple problems in the above topics. **1.2 Electrostatics and Capacitance:** Electric flux - Electric flux density - Electric field intensity - Electric potential - Coulomb‘s laws of electrostatics. Concept of capacitance - relationship between Voltage, Charge and Capacitance - Energy stored in a capacitor - capacitance of parallel plate capacitor - capacitors in series and in parallel - Simple Problems.	15

II	**Network Theorems** **2.1 Network analysis :** Definition of Network - Branches - Nodes. Mesh current and Node voltage analysis. **2.2 Transformations :** Voltage source to Current source and Current source to Voltage source transformation - Star to Delta and Delta to Star transformations. **2.3 Theorems :** Thevenin's Theorem - Norton's Theorem, Superposition Theorem and Maximum power transfer theorem. (Problems on all the above topics in D.C circuits only)	14
III	**Single phase A.C Circuits** **3.1 AC Fundamentals :** J operator - rectangular and polar coordinates - Concept of Vector diagram - Sinusoidal voltage and current - instantaneous, peak, average and effective values - form factor and peak factor (derivations for sine wave only) **3.2 AC Series Circuits :** Pure resistive, inductive and capacitive circuits - RL, RC and RLC series circuits - impedance - phase angle – phasor diagram - power and power factor -power triangle -apparent power, active and reactive power (Problems on all the above topics)	15
IV	**Parallel Circuits & Resonance** **4.1 Parallel Circuits :** Parallel circuits (two branches only) - conductance, susceptance and admittance – problems. **4.2 Series resonance:** Concept of Resonance - Effects of varying inductance and capacitance in series RLC circuit - Resonant Frequency - Q' factor – Half power frequencies - Bandwidth – problems. **4.3 Parallel resonance:** Two branch Parallel circuits, - Resonant Frequency - Q-Factor – Dynamic impedance - Band width - problems. Comparison of series and parallel resonance. Applications of Resonant circuits.	14
V	**Three phase A.C. Circuits** **5.1 Three phase AC circuits:** 3 Phase Generation - wave form - Equations -Phasor diagram - Phase sequence -Advantages of three phase system over single phase system. Star, Delta connections – Concept of Balanced and unbalanced load - Relation between line and phase values of voltages, currents in star and delta connection. **5.2 Three phase Power:**	15

	Three phase power - Power delivered by Star connected and Delta connected loads - Problems in balanced loads of star and delta connections Measurement of 3 phase power and power factor using two wattmeter method (Derivation and Problems) .	

REFERENCE BOOKS			
Sl.No.	**Name Of The Book**	**Author**	**Publisher**
1	Electric circuit theory	Arumugam N. Premkumaran	Khanna Publishers, New Delhi
2	A Text book of Electrical Technology volume-I	B.L.Theraja	S.Chand & Co New Delhi
3	Fundamentals OF Electrical circuit theory	B. Chattopadhyay P.C.Rakshit	S.Chand & Co New Delhi
4	Circuit and networks	A. Sudhakar & Shyam Mohan S Palli	Tata -Mc Graw Hill.

ONLINE RESOURCES

www.allaboutcircuits.com/textbook/direct.../electric-circuits/

www.electrical4u.com/electrical-engineering-objective-questions-mcq/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3202 Term : III

Course Name : ELECTRICAL MACHINES I

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3202	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	D.C Generators	15
II	D.C Motors	15
III	Single phase Transformers	15
IV	Three phase Transformers	15
V	Storage Batteries	13
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

This subject is classified under core technology group which intends to teach facts, concepts, principles & procedure for operation & testing of electrical machines,

such as DC generators, DC motors and single & three phase transformers. Student will be able to analyze the characteristics of DC motors, Transformers & Qualitative Parameters of these machines. Knowledge gained by the students will be helpful in the study of technological subjects such as Power systems, utilization of electrical energy, manufacturing processes & testing and maintenance of electrical machines.

OBJECTIVES

- Understand the concept of magnetic circuit principle and associated laws
- Know the DC generator principle, construction, types, characteristics, efficiency and applications.
- Know the DC motor principle, construction, types, characteristics, testing and starters.
- Know the principle, construction & characteristics of single phase transformer, auto transformer
- Know the principle, construction and characteristics of three phase transformer
- Know the different connection and paralleling of transformers
- Explain the Concept of storage batteries, care, maintenance and applications

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**DC GENERATOR** 1.1 Principle : Review of electromagnetic induction – Properties of Magnetic flux - Faraday's laws – Fleming's right hand rule – Principle of operation of D.C. generators –Construction of D.C. generators – Field system– Types of armature windings – Principles of lap and wave windings – EMF equation – simple problems. . 1.2 Characteristics of D.C. generators – Building up of voltage of D.C. Shunt generators –– No load characteristics of Shunt generator – Determination of critical field resistance – Causes of failure to build-up voltage and remedy – Load characteristics of series and shunt generators – load characteristics of cumulatively and differentially compounded generators . 1.3 Armature reaction – methods of compensating armature reaction – process of commutation - methods of improving commutation.	15

	Load characteristics of DC generators — Applications of DC generators	
II	**DC MOTOR** 2.1 Principle of D.C. Motors – Fleming's left hand rule – Construction and working of DC motor – Back emf – Torque equation. 2.2 Characteristics of DC motors: Torque-current, Speed-current, Speed-Torque characteristics of different motors – Speed control of DC motors – Field control and armature control – necessity of Starters – 3 point and 4 point starter - losses in D.C. Machines. 2.3 Testing of D.C. machines – Predetermination of efficiency of motor and generator by Swinburne's test – Problems in above topics – Applications of D.C. Motors.	15
III	**SINGLE PHASE TRANSFORMER** 3.1 Principle & Construction – Working principle of Transformer - constructional details of core, shell type transformers – coil assembly. 3.2 EMF Equation – Voltage ratio – Transformer on No load – Transformer on load – Current ratio – Phasor diagram on no load and on 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– Problems on the above topics 3.3 All day efficiency - polarity test– Parallel operation of single phase transformers– Auto transformer – principle – saving of copper – applications.	15
IV	**THREE PHASE TRANSFORMER** 4.1 Three phase Transformer construction – Construction of Three phase Transformer - Types of connections – Star-star, Star-Delta, Delta-Star, Delta-delta connections – Scott connection - V connection of transformer – Parallel operation of three phase transformers. 4.2 Grouping of transformers - Conditions – Phasing out test – Pairing of transformer - Load sharing of transformers with equal and unequal ratings 4.3 Accessories & Testing of transformers – Various cooling arrangements – Transformer accessories – conservator – breather – explosion vent – Bucholz relay–ON load and OFF load tap changer – Transformer oil tester – Acidity test -– Earthing – Measurement of earth resistance.	15
V	**STORAGE BATTERIES** Classification of cells – Construction, Chemical action and	13

	physical changes during charging and discharging of Lead Acid, Nickel Iron and Nickel Cadmium Cells – Advantages and Disadvantages of Nickel Ion and Nickel Cadmium Cells over Lead Acid Cell - indication of fully charged and discharged battery – defects and their remedies – capacity - AH efficiency and WH efficiency (no problems) — methods of charging - care and maintenance — applications – maintenance free batteries – Lithium Cells, Lithium-Ion Cells and Mercury Cells – Concept of Rechargeable Cell.	

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	A course in Electrical Technology (Vol - II) MCE-2005	B.L.Theraja	S.Chand & Co New Delhi

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Electrical machines A course of Electrical Engg 4th Edition-2014.	K.Bhattacharya, Principal,TTTI, Chandigar	Tata -Mc Graw Hill , New Delhi
2	Operation & Maintenance of Electrical Machines	B.V.S. Rao	Khanna Publishers, New Delhi
3	Electrical Technology 10th Edition -2010	Edward Hughes	Addision – Wesley International Student Ed.

ONLINE RESOURCES

www.nptel.ac.in/courses/108105017/

www.nptel.ac.in/courses/108106071/

www.electrical4u.com/battery-history-and-working-principle-of-batteries/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3203 Term : III

Course Name : ELECTRONIC DEVICES AND CIRCUITS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3203	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

UNIT	Topic	Hrs.
I	Components and its applications	16
II	Bipolar Junction Transistor	15
III	Transistor oscillators and FET and UJT	15
IV	Basics Of Power Electronic Components	14
V	Opto Electronics Devices and Wave shaping Circuits	13
Test & Model Exam		7
Total		**80**

RATIONALE:

The aim of introducing this course is to impart knowledge of basic Electronics devices to the students of Electronics Engineering. Through the study of this course, the students will get knowledge of construction, working & characteristics of various types of diodes and transistors. The study of the devices will be helpful to understand the various basic and applied technology courses.

OBJECTIVES:

- Familiarize various passive and active components
- Study the working principle of PN junction diode and transistor
- Understand the working principle of different types of rectifiers

- Differentiate various types of amplifiers
- Study the performance of special devices like UJT, FET
- Study the performance of different transistor oscillators
- Study the performance of SCR, DIAC, TRIAC and IGBT
- Know the construction and working principle of optoelectronic devices
- Study the performance of solar cell
- Explain the concept of wave shaping circuits such as clippers and clampers

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**COMPONENTS AND ITS APPLICATIONS** **Chapter: 1.1: COMPONENTS** Electronic components - Passive components -Resistors -Fixed and variable - Colour coding -Uses -Capacitors -Fixed and Variable - Uses. Inductors -Fixed and Variable-Uses. **Chapter: 1.2: SEMICONDUCTOR DIODES** Semiconductors -PN Junction diode -Forward and Reverse bias characteristics - Specifications - Zener diode -Construction & working principle -Characteristics -Zener break down -Avalanche break down -Zener diode as a voltage regulator -Applications - Specifications. **Chapter: 1.3: APPLICATIONS OF COMPONENTS** Rectifier –Introduction - Classification of Rectifiers - Half Wave Rectifier, Full Wave Rectifier & Bridge Rectifier - Comparisons(no derivations) -Efficiency -Ripple factor -Applications -Filters -C, LC and PI Filters.	16
II	**BIPOLAR JUNCTION TRANSISTOR** **Chapter: 2.1: BASIC CONCEPTS** Transistor -Transistor as an amplifier -Transistor Biasing -Fixed bias, Collector base bias, Self bias **Chapter: 2.2: CONFIGURATIONS** CB, CE, CC Configurations -Characteristics - Comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain **Chapter: 2.3: TRANSISTOR APPLICATIONS** RC coupled amplifier - Emitter follower and its applications - Negative feedback - Concept, effect of negative feedback – types of negative feedback connections- Transistor as a switch.	15

III	**TRANSISTOR OSCILLATORS AND FET AND UJT** **Chapter: 3.1: TRANSISTOR OSCILLATOR** Transistor Oscillator-Classifications-Condition for Oscillation (Barkhausen criterion) - General form of LC Oscillator - Hartley Oscillator - Colpitts Oscillator - RC Phase shift Oscillator, Crystal oscillator. **Chapter: 3.2: FIELD EFFECT TRANSISTOR** Field effect Transistor– Construction - Working principle of FET - Difference between FET and BJT - classification of FET - Characteristics of FET -Specifications -FET amplifier (Common source Amplifier), FET as CHOPPER. **Chapter: 3.3: UNIJUNCTION TRANSISTOR** UJT - Construction - Equivalent circuit - Operation – characteristics -UJT as a Relaxation Oscillator.	15
IV	**BASICS OF POWER ELECTRONIC COMPONENTS** **Chapter: 4.1: SILICON CONTROLLED RECTIFIER** SCR -Introduction -Working -Two transistor analogy of SCR - VI characteristics - SCR as a Switch -Specifications. **Chapter: 4.2: DIAC & TRIAC** DIAC -Construction -Working -Characteristics -Diac as bi-directional switch - TRIAC -Basic working principle -Characteristics **Chapter: 4.3: MOSFET & IGBT:** MOSFET -Construction -Characteristics -MOSFET as a Switch - CMOS - basic concept - IGBT -Basic principle -IGBT as a Switch.	14
V	**OPTO ELECTRONICS DEVICES AND WAVE SHAPING CIRCUITS** **Chapter: 5.1: OPTO ELECTRONICS DEVICES:** LDR, LED, LCD, Opto coupler, Opto interrupter -Infrared transmitter and Receiver -Laser diode (simple treatment) -Solar cell -Avalanche Photodiode - Photo transistor. **Chapter: 5.2: WAVE SHAPING CIRCUITS:** Construction and working of Positive, Negative and biased Clippers - Construction and working of Positive and Negative Clamper **Chapter: 5.3: VOLTAGE MULTIPLIERS** Construction and working of Voltage Doubler and Tripler	13

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Principles of electronics Re-Ed, 2010	V.K. Mehta	S.Chand & Co

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Electronic devices applications and integrated circuits 5th Edition, 2010	Mathur Kulshreshtha Chadha	Umesh publications, New Delhi – 6
2	Integrated circuits 1st Edition, 2008	K.R. Botkar	Khanna Publishers, New Delhi
3	Electronic devices and circuits 23rd Edition, 2008	G.K. Mithal	Khanna Publishers, New Delhi
4	Electronic devices and circuits 2nd Edition 2008	Salivahanan, N.Suresh Kumar A.Vallavaraj	Tata -Mc Graw Hill , New Delhi

ONLINE RESOURCES

www.electronics.wisc-online.com/category.aspx

www.electrical4u.com/theory-of-semiconductor/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course code : 2F3204 Term : III

Course Name : MEASUREMENTS & INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course code	Instruction periods per week		Credit	Total periods per term	Scheme of examinations			
	Theory	Practical			Duration (hrs)	Internal assessment marks	End exam marks	Total marks
2F3204	4	--	4	64	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit no	Topic	Hours
I	CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS	11
II	MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE	12
III	MEASUREMENT OF POWER, POWER FACTOR AND FREQUENCY	12
IV	BRIDGES,CRO AND SIGNAL CONDITIONERS	11
V	SENSORS AND TRANSDUCERS	11
	Cycle tests and model examination	07
	Total	64

RATIONALE

The course “Electrical measurement and measuring instruments” is important in the field of electrical engineering. This course deals with the methods of measuring voltage, current, power, energy, frequency, power factor & parameters like resistance, inductance and capacitance and constructional detail and principle of operation of the instruments used for such measurements. Also it provides the methods to extend the range of low range instruments to measure higher values. The detailed classification of all instruments used for the above measurement is dealt.

OBJECTIVES

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

- Understand the basic concepts on measuring system and definition of important terms,
- Know the various analog instruments used to measure voltage, current and resistance
- And their principle of working, construction and applications.
- know the construction, working and applications of cathode ray oscilloscope
- know the construction, working and applications of wattmeters and energy meters
- understand the concept of digital meters.
- know the special instruments like md indicator, trivector meter, synchroscope, etc.
- understand basic transducers and their working.

DETAILED SYLLABUS

Contents: Theory

UNIT	NAME OF THE TOPIC	HOURS
I	**CLASSIFICATION AND CHARACTERISTICS OF INSTRUMENTS** General - Definition of Measurement – Functions of MeasurementSystem (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 and Damping Forces.	11
II	**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	12

	– Testing, Errors and Characteristics of CT and PT. Classification of Resistance – Measurement using Conventional Method — (Ammeter — Voltmeter Method) Measurement of LowResistance using Kelvin‟s Bridge Ohmmeter – Measurement of Medium Resistance using Wheatstone Bridge — High Resistance using Megger - Earth Resistance – U Earth Tester – Multimeters.	
III	**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 andOperation ——- Digital Energy Meter.- Smart meters - Multi function energy meter for measuring various electrical parameters. Power Factor Meters – Single Phase Electro Dynamometer Type – Construction and Working – Phase Sequence Indicator – Phase Difference Measurement using Synchro scope –Tri-vector Meter –Merz Price Maximum Demand Indicator. Frequency Measurement Frequency Meter — Digital Frequency Meter (Simplified Block Diagram)	12
IV	**BRIDGES,CRO AND SIGNAL CONDITIONERS** Measurement of Inductance using Maxwell‟s Inductance Bridge and Andersons Bridge —Measurement of Capacitance using Schering Bridge. Cable fault location - murray and varley loop tests. CRO —— Block Diagram —— CRT —— Applications - Measurementsof Voltage, Frequency and Phase Difference Using CRO – Digital Storage Oscilloscope – Block Diagram. **SIGNAL CONDITIONER:** Basic Components of Signal Conditioning System.	11
V	**SENSORS AND TRANSDUCERS** Definition – Types of Transducers **PASSIVE TRANSDUCERS**: Resistive Transducer – Strain Gauge – Capacitive Transducer – Inductive Transducer – Proximity Sensor – Construction andOperation of LVDT and RVDT. **ACTIVE TRANSDUCERS**: RTD – Thermistor - Thermocouple – Synchrous – Piezoelectric Transducer-Measurement of Pressure and Vibration – Hall Effect Transducer — Photovoltaic Transducer — Photoconductive Transducer. **TELEMETRY:** Block Diagram and its Applications. .	11

Reference books			
Sl.no.	**Name of the book**	**Author**	**Publisher**
1	Electronic instrumentation 3rd edition -2010	HS KALSI	TATA MCGRAW HILL,NEW DELHI
2	Modern electronic instrumentation and measurement techniques	ALBERT D.HEIFRICK WILLIAM DAVID COOPER	LEARNING MATERIALS CENTRE, ISTE,NEW DELHI
3	A course in electrical and electronic measurements and instrumentation	UMESH SINHA	SATYA PRAKASHAN,NEW DELHI
4	Measurement and Instrumentation	ARUN.K	PHI 2010

ONLINE RESOURCES

www.electrical-engineering-portal.com/download-center/books-and-guides

www.vssut.ac.in/lecture_notes/lecture1423813026.pdf

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3205 Term : III

Course Name : ELECTRICAL CIRCUITS AND MACHINES LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3205	-	5	3	80	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Circuit diagram	30
2	Connections and proceeding the Experiment	30
3	Reading/calculation/graph/result	30
4	Viva Voce	10
5	TOTAL	100

RATIONALE

The background of theoretical knowledge about Electrical Circuits, machines and measurements has been imparted in the theoretical papers. However, the electrical Diploma Holders will require handling various Electrical Instruments and machines in the field whenever they are given chance. So, it is necessary to acquaint the students with the practical aspects handling the Instruments & machines to increase their confidence and develop skill of measurements, data entry, graph reading, analysis of the experimental results, etc.

The coverage of syllabus is made in such a way that the students will get

through knowledge of Handling the machines & Instruments. By performing such experiments they will gain confidence to face the problems and rectify them boldly. The students will develop skills of measuring data, their tabulations, plotting graphs, interpreting the data and the graphs to develop analytical skill.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Verify Ohm's Law and Kirchoff's Law
- Verify Superposition, Thevinin's and Maximum power transfer theorems
- Obtain resonance of the given RLC Series circuit
- Measure Single phase and Three phase ac power
- Calibrate the given Ammeter and Voltmeter and to obtain error
- Obtain Open Circuit Characteristics of self excited DC shunt generator
- Obtain Load characteristics of DC generators(Series, shunt & compound generator)
- Conduct Load test on Dc Series motor and DC Shunt motor
- Control the speed of DC shunt motor
- Predetermine the efficiency of DC machine by Swinburne's tests
- Predetermine the efficiency and regulation of the single phase transformer.
- Understand the construction and working of DC starters

DETAILED SYLLABUS

Contents: Practical

SNO	List of Experiments
CIRCUITS	
1	Verification of Ohms Law
2	Verification of Kirchoff's Law
3	Verification of Super Position Theorem with two DC Voltages for a common load.
4	Verification of Thevinin's Theorem with a DC supply
5	Measurement of single phase power by (i) Ammeter & Voltmeter (ii) Wattmeter
6	Measurement of three phase power by two wattmeter method
7	Vector diagram of RLC Series Circuit
MACHINES	
8	Open Circuit Characteristics of self excited DC shunt generator
9	Load test on a DC series generator
10	Load test on a DC shunt generator
11	Load test on a DC compound generator
12	Load test on a DC series motor
13	Load test on a DC shunt motor
14	Speed control of DC shunt motor using armature control & field control.
15	Predetermination of efficiency of DC machine by Swinburne‘s test.
16	Load test on the single phase transformer
17	Predetermination of efficiency and regulation of the single phase transformer by OC & SC tests
18	Equivalent circuit constants of the single phase transformer by OC & SC tests
19	Parallel operation of single phase transformers
20	Load test on three phase transformer
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 20 Questions	

RESOURCE REQUIREMENTS

Sl.no	LIST OF EQUIPMENTS	Quantity Required
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 Shunt Generator 3 / 5 KW (or more) coupled with Prime Mover	1
4	DC Series Generator 3 / 5 KW (or more) coupled with Prime mover	1
5	DC Compound Generator 3 / 5 KW (or more) coupled with Prime mover	1
6	DC regulated power supply	2
7	1 phase Transformer 1KVA (or more) 220V/110V	2
8	3 phase Transformer 1 KVA (or more) 440V/220V	1
9	1 phase Variac 15 Amps	3
10	3 phase Variac 15 Amps	1
11	Loading Rheostat 220V, 30A / Single phase Resistive loading	2
12	Tachometer Analog / Digital type	2
13	3 point starter / 4 point starter	3
14	Rheostat – various ranges 30Ω 50Ω,100Ω,1500Ω	10
15	Ammeter (AC and DC) - various ranger 0-1,0-2,0-15,0-30 Amps	10
16	Voltmeter (AC and DC) various ranges 0-75V,0-150V, 0-300V,0-600V	10
17	Wattmeter-various ranges LPF 75/150/300/600 Volts	1
18	Wattmeter-various ranges UPF 75/150/300/600 Volts	3

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3206 Term : III

Course Name : ELECTRONIC DEVICES AND CIRCUITS LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3206	-	5	3	80	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Circuit diagram	30
2	Connection	30
3	Execution	25
4	Output / Result	10
5	Viva Voce	05
	Total	100

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in 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 Practical. By doing practical experience in this, they will be skilled in handling all types of electronic circuits and able to apply the skill in electronic systems.

OBJECTIVES:

After the completion of this laboratory, the student should be able to

- Draw the circuit diagrams of biasing circuit and obtain characteristics of PN junction diode, Zener diode, JFET, UJT, SCR, DIAC, TRAIC, LDR, Photo diode and Photo transistor, clipper clamper and voltage doubler.
- Draw the circuit diagrams of Rectifiers, filters, transistors, amplifier and oscillators
- Assemble / construct all the above circuits.
- Test the above circuits for their performance
- Analyses the above circuits

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
1	VI Characteristics of PN Junction Diode
2	VI Characteristics of Zener diode
3	Half wave with and without filter
4	Full wave rectifier with and without filter
5	Bridge Rectifier with and without filter
6	VI characteristics of Regulator using zener diode.
7	Input/output characteristics of CE Transistor
8	Frequency response of RC coupled amplifier
9	Emitter follower
10	RC phase shift oscillator.
11	Hartley and Colpitts oscillator
12	JFET characteristics
13	UJT characteristics.
14	SCR characteristics
15	DIAC and TRIAC characteristics
16	Clipper, clamper and voltage doubler.
17	LDR, Photo diode and Photo transistor characteristics.
18	Solar cell and opto coupler.
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 18 Questions.	

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	10
2.	High Voltage Power Supply	0-250V,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

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F3207 Term : III

Course Name : ELECTRICAL WORKSHOP

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F3207	-	5	3	80	3	25	100*	100

*Examination will be conducted for 100 Marks and it will be reduced to 75 Marks

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Connection Diagram	25
2	Tools Required	20
3	Dismantling and Assembling Procedure	30
4	Testing	20
5	Viva Voce	5
6	TOTAL	100

RATIONALE:

Workshop SKILL is also a kind of ESSENTAL PRACTICAL KNOWEDGE required for the Engineering students in general and Diploma Students in particular. A Diploma holder must know how to behave and work on shop floor. This helps to develop psychomotor skill and attitude. Workshop practice is the backbones of the real industrial work situation, which helps in development and enhancement of relevant skill required by the technical working in engineering industries and

workshops. They will be using different types of tools/equipment in different shops for fabrication and servicing.

. This Electrical Workshop will impart practical knowledge to the Diploma students servicing of domestic appliances, .and the skill on assembling and test of household electrical appliances.

OBJECTIVE

- To Identify and use the tools used in servicing of electrical appliances.
- To Assemble the various parts of domestic appliances.
- To Make the electrical connections and test its performance.
- To Demonstrate observance of the safety consciousness and good housekeeping in a workshop.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Exercises
1	Familiarization of tools used for electrical repair works and personal protection equipments.
2	Dismantling of Electrical iron box, identifying the parts, checking the conditions, assembling and testing.
3	Dismantling of Mixer Grinder, identifying the parts, checking the conditions, assembling and testing.
4	Dismantling of Wet Grinder, identifying the parts, checking the conditions, assembling and testing.
5	Assembling the accessories of ceiling fan, test the connections of winding & capacitor and run the fan with speed regulator.
6	Connect the battery and inverter to supply partial load in a domestic wiring during mains failure.
7.	Assembling and testing of 15 watts LED light.
8.	Battery charging through solar panel. Connect solar panel to charge battery through charge controller.
9.	Dismantling of induction heater, identifying the parts, checking the conditions, assembling and testing
10.	Dismantling of Washing Machine, identifying the parts, checking the conditions, assembling and testing.

Detailed Allocation of Marks

S.No.	NAMEOFTHE ACTIVITY	MARKS ALLOCATED
1.	Connection Diagram	25
2.	Tools Required	20
3.	Dismantling and Assembling Procedure	30
4.	Testing	20
5.	Viva Voce	05
	TOTAL	**100**

LIST OF EQUIPMENTS (FOR A BATCH OF 30 STUDENTS)

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1.	Tools: Screwdriver, Cutting pliers, Wire Stripper, Hammer, Spanner set, Line Tester, Nose pliers.	Each 2set
2.	Personal Protective Equipments: Safety helmet, Google, Safety gloves, Nose mask, Ear plug, Safety Belt.	Each 2Set
3.	Automatic Iron Box	2
4.	Wet Grinder	2
5.	Mixer Grinder	2
6.	Ceiling Fan	2
7.	LED Light, PCB, Driver Circuit and Outer Cover	10
8.	Lead Acid Battery	2
9.	Inverter	2
10.	Solar Photo Voltaic Module	2
11.	Charge controller	2
12.	Washing Machine	1
13.	Multi meter	8
14.	Induction Heater	1

TERM – IV

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4301 Term : IV

Course Name : ELECTRICAL MACHINES II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4301	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Alternator Principle & Construction	15
II	Alternator Performance	15
III	Three Phase Induction Motor	15
IV	Synchronous Motor & Single Phase Motors	15
V	Special AC and DC Machines	13
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

This course is classified under core technology group intended to teach students of facts, concepts, principles & procedure for operations and testing of electrical machines such as induction motor, alternator and synchronous motor. Student will be able to analyze the characteristics and qualitative parameters of these machines. The knowledge gained by the student is useful in the study of technological subjects such as control of electrical machines Utilization of electrical energy.

OBJECTIVES

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

- To know alternator principle, construction, types, emf induced and cooling.
- To know the performance characteristic and paralleling of alternator, test and predetermination of performance characteristic of alternator.
- 3 phase induction motor construction, principle, types, characteristics, applications and starting
- Synchronous motor starting, running and applications, comparison with induction motor.
- Single phase motors types, construction, characteristic and applications.
- Induction motor types, ratings and maintenance.
- Starter maintenance.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**ALTERNATOR PRINCIPLE & CONSTRUCTION** **1.1 Alternator Principle & Construction:** Basic Principle & Requirements of alternator – Rotating Field System & Rotating Armature System -Advantages of Rotating Field (Stationary Armature) System -Types of Rotor - Salient Pole rotor - Non Salient pole rotor - Construction -Salient Pole -Non Salient Pole -Turbo Alternator **1.2 Windings & EMF equation:** Types of armature windings (No winding diagram) - Single layer- Double layer -Lap & Concentric winding -Integral slot winding - Fractional Slot winding -Phase spread -Pitch Factor -Distribution factor-EMF equation of alternators-Simple problems- Effect of Pitch factor on EMF-Advantages of chorded pitch winding - Effect of pitch factor on harmonics-Methods of obtaining Sine wave in salient pole & non salient pole alternators **1.3 Cooling of alternators**: Different methods -Horizontal, vertical - Natural & forced cooling - Hydrogen Cooling & its Merits.	15
II	**ALTERNATOR PERFORMANCE** **2.1Alternator Performance:** Alternator on No load -Effective Armature resistance –Leakage reactance -Reactance due to armature reaction– Synchronous reactance - Synchronous impedance – Causes for Voltage drop in alternators (Simple problems)– Vector diagram of alternators on load (for lag, lead and unity power factors) **2.2 Testing :** Open circuit & Short circuit test –Determination of regulation by direct load test - Pre-determination of Regulation by EMF method, MMF method, ZPF method **2.3 Parallel operation of alternators :** Necessity of Synchronization	15

	-Advantages -Methods –Dark lamp method -Bright Lamp method - Synchroscope method - Synchronizing current, Synchronizing power, Synchronizing torque -Effect of change in excitation of alternators in parallel -Load sharing of two alternators (Simple problems)	
III	**THREE PHASE INDUCTION MOTOR** **3.1 Principle & construction:** rotating magnetic field produced by 2 phase and 3 phase system - principle of operation of 3 phase induction motor - construction - slip and slip frequency - comparison between cage and slip ring induction motors **3.2 Characteristics of motor :** starting torque derivation -condition for maximum starting torque - torque under running condition -torque in synchronous watts -slip-torque characteristics - relationship between starting torque and full load torque (no problems) - development of phasor diagram of three phase induction motor no load test and blocked rotor test - development of approximate equivalent circuit - development of circle diagram -determination of maximum torque, slip etc., (no problems) - speed control by injected e.m.f. method, rotor resistance method **3.3 Starters & other induction motors:** starters for induction motor - direct on line starter, rotor resistance starter -auto transformer starter - star delta starter- soft starters , crawling, cogging in induction motor. -construction, working principle and applications of double cage motor, linear induction motor and induction generator	15
IV	**SYNCHRONOUS MOTOR & SINGLE PHASE MOTORS** **4.1 Synchronous Motor**: Basic theory - Reasons for not self starting - Different methods of starting Synchronous motor - Vector diagram on No load (Simple problems) - V Curve and inverted V curve for different excitation at constant input power -Effect of change in excitation **4.2 Power Factor Improvement:** Power factor improvement using Synchronous motor (Simple problems) Hunting -Applications of Synchronous Motors –Comparison between Synchronous motor & Three phase induction motor. **4.3 Single Phase Induction Motor:** Double Field Revolving theory for Single phase Induction Motor -Construction, Principle of working & applications of Split Phase motors, Capacitor type motors, Shaded pole motor, Universal motor, Repulsion motor.	15
V	**SPECIAL AC AND DC MACHINES** **5.1 SPECIAL AC MACHINES :** Permanent magnet Synchronous motors – Construction and performance – Advantages – Applications –Synchros – Constructional features – Control Transmitter – Control	13

	receiver - Applications of synchros – A.C. Servo motors – Two phase A.C. Servo motor – Linear induction motor **5.2 SPECIAL DC MACHINES :** Permanent Magnet D.C. Motor **–** Construction**–**Working principle **–** Speed control **–** Advantages **–** Applications **–** Servo motors **–** D.C. Servomotors **–** Stepper motors **–** Variable reluctance stepper motor **–** Permanent magnet stepper motor	

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	A text book of Electrical Technology 23rd Re-edition, 2006	B.L.Theraja A.L. Theraja	S.Chand & Co New Delhi

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Electrical machines 4th Edition, 2014	S.K.Bhattacharya	Tata -Mc Graw Hill , New Delhi
2	Operation and Maintenance of Electrical Machines	B.V.S. Rao	Khanna Publishers, New Delhi
3	Electrical Technology 10th Edition, 2010	Edward Hughes	Addision -Wesley International Student Ed.
4	Performance and design of AC machines, 3rd Edition 2002	M.G.Say	CBS Publication, New Delhi

ONLINE RESOURCES

www.nptel.ac.in/courses/108106072/

www.electrical4u.com/alternator-or-synchronous-generator/

www.electrical4u.com/electrical-motor-types-classification-and-history-of-motor/

www.electrical4u.com/electrical-power-transformer-definition-and-types-of-transformer/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS
F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4302 Term : IV

Course Name : ANALOG AND DIGITAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4302	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Linear ICs: Op-amps, Timers and their applications	15
II	Boolean Algebra	14
III	Combinational Circuits	15
IV	Sequential Circuits	14
V	D/A, A/D and Memory	15
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

The main aim of this subject is to enable to students to know the basic concepts of analog and digital electronics and gain familiarity with the available IC chips. This will form a broad base for studying computer troubleshooting, microcontrollers and further studies.

OBJECTIVES

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

- Explain the characteristics of op. amp.
- Explain the various applications of op.amp.
- Explain the functional block diagram of 555 Timer.
- Explain Astable and Monostable Multivibrator using 555.
- State and explain Demorgan‘s Theorems
- Write the Truth Table and symbol of Logic gates OR, AND, NOT, NAND NOR, Ex-OR.
- Simplify Logic functions using Karnaugh‘s map.
- Explain the operation of Half-Adder, Full Adder, Half Subtractor, Full Subtractor.
- Explain parity Generator & Checkers,Decoder ,Encoder, Demultiplexer and Multiplexer
- Explain various Digital Logic families
- Explain various FF, D, T, SR, and MSJK.
- Explain Asynchronous Binary counter, Decode Counter, synchronous counter
- Explain weighted register and R-2R Ladder Type D/A convertor
- Explain simultaneous, Ramp, successive approximation, Dual slope A/D Converter

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**LINEAR ICS: OP-AMPS, TIMERS AND THEIR APPLICATIONS** **1.1 Op-amps :** Operational amplifier -Ideal Op.Amp -Block diagram and characteristics - (Minus input follows Plus input and No current through Minus and Plus input) -op-amp parameters -CMRR -Slew rate -Virtual ground **1.2 Applications of op amp :** Inverting amplifier - Summing amplifier -Non inverting amplifier -Voltage follower -Comparator - Zero crossing detector - Integrator – Differentiator - Op.Amp Specifications. **1.3 Timer :** 555 Timer - Functional Block diagram – Astable Multivibrator(using ic 555) , Monostable Multivibrator(using ic 555) and Schmitt Trigger(using ic 555) . IC voltage regulator - 3 pin IC regulators - 78 xx, 79xx, LM317	15

II	**BOOLEAN ALGEBRA** **2.1 Number systems & Boolean Algebra :** Decimal -Binary -Octal - Hexadecimal -BCD - Conversion from one number system to other – Boolean Algebra -Basic laws and Demorgan's Theorems **2.2 Logic gates :** OR -AND -NOT -NOR -NAND -EXOR : Symbols, Truth table and Boolean expression -Realization of gates using universal gates NAND and NOR **2.3 Simplification Of Boolean Expressions :** Problems using 2, 3, and 4 variables -Boolean expression for outputs -Simplification of Boolean expression using karnaugh map (upto 4 variable)- Constructing logic circuits for the Boolean expressions.	14
III	**COMBINATIONAL LOGIC CIRCUITS** **3.1 Arithmetic circuits :** Binary addition - Binary Subtraction - 1's complement and 2's complement - Signed binary numbers - Half adder - Full adder - Half subtractor - Full subtractor **3.2 Functional Logic circuits :** Parity Generator and checker - Digital comparator - Arithmetic Logic Unit - Decoder - 3 to 8 decoder - BCD to seven segment decoder - Encoder - Multiplexer - Demultiplexer - Digital Logic families **3.3 Digital Logic families :** TTL NAND - CMOS NOR - LS series - Fan in - Fan out - Propagation delay - Noise immunity for the above families.- Tristate Logic.	15
IV	**SEQUENTIAL LOGIC** **4.1 Flip-flops :** RS -D -T -JK -Master Slave Flip Flops -Edge triggered FF **4.2 Counters** : Asynchronous Binary Counter - Decade counter - Mod n counter - Up/ Down Counter - Ring counter - Johnson counter - Synchronous 4 bit up counter **4.3 Shift register :** 4 bit shift register - Serial in Serial out - Serial in Parallel out - Parallel in Serial out - Parallel in Parallel out.	14
V	**D/A, A/D AND MEMORY** **5.1 D/A Converter :** Basic concepts - Weighted Resistor D/A converter and R-2R Ladder D/A converter - Specification of DAC IC. **5.2 A/D Converter :** Analog to digital conversion using Ramp method – Successive approximation method - voltage to frequency converter - Frequency to voltage converter - specification of A/D converter. **5.3 Memory :** Static Memory - Dynamic Memory - Static Memory organization in terms of address lines, control lines and data lines - Expanding memory (say 8k to 16k) SDRAM - DDR RAM.	15

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Digital Principles and applications, 1st Edition,2006	Albert Paul Malvino Donold P. Leach	TMH New Delhi
2	Integrated Circuits 1st Edition,2008	K.R.Botkar	Khanna Publishers, New Delhi

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Modern Digital Electronics 4th Edition,2009	R.P.Jain	TMH New Delhi
2	Electronics Devices Application and Integrated Circuits , 5th Edition	Mathur Kulshreshtha Chadha	Umesh publications, New Delhi - 6
3	Digital Electronics 6th Edition 2004	Roger L. Tokheim Macmillan	McGraw -Hill -

ONLINE RESOURCES

www.electrical4u.com/digital-electronics/

www.electronics.wisc-online.com/category.aspx

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4303 Term : IV

Course Name : ENERGY CONSERVATION AND AUDIT

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4303	4	--	4	64	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Name of the Topic	Hours
I	Energy Conservation and its Importance	11
II	Energy Conservation in Electrical Machines	11
III	Energy Conservation in Electrical Installation Systems	11
IV	Energy Audit and Instruments	12
V	Energy Costs and Energy Audit Report	12
	Cycle Tests and Model Examination	07
	Total	64

RATIONALE

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 system.

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 product 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 consumed.
- ✓ Explain Energy Costs.
- ✓ Explain how to Detect and improving 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

DETAILED SYLLABUS :

Contents: Theory

Unit	Name of the Topics	Hours
I	**ENERGY CONSERVATION AND ITS IMPORTANCE** Definition - Need 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. 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 Labelling: Need and its benefits.	**5** **6**
II	**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** **5**

III	**ENERGY CONSERVATION IN ELECTRICAL INSTALLATIONSYSTEMS** 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 luminaries. 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** **5**
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 **6**

V	**ENERGY COSTS AND ENERGY AUDIT REPORT** Understanding Energy Costs Energy Cost in Indian Scenario - Co-generation and Tariff - Concept, Significance for Energy Conservation - Co-generation - Types of Cogeneration on basis of sequence of Energy use (Topping cycle, Bottoming cycle) - Types of Co-generation basis of Technology (Steam Turbine Co-generation, Gas Turbine Co-generation, Reciprocating Engine Co-generation) .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 System to reduce Energy bill. Benchmarking and Energy Performance - Energy Audit Report Format - Guidelines for writing Energy Audit Report - Data presentation in Report.	6 6

REFERENCE BOOKS

1. "Er. Udit Mamodiya" "Electrical Energy Conservation & Auditing", Ashirwad Publication.
2. "M A Chaudhari ,S M Chaudhari & S A Asarkar ", "Energy Conservation & Audit " , "Nirali Prakashan" Publication.
3. O.P. Gupta, "Energy Technology", Khanna Publishing House, New Delhi

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4401 Term : IV

Course Name : E VEHICLE AND POLICY

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4401	4	--	4	64	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Environmental impact and history, Types of Electric	12
II	Electric vehicle, Electrical Propulsion System	12
III	Energy Storages, Charging System, Effects and Impacts	11
IV	Electric Mobility Policy Frame Work	11
V	Tamilnadu E-Vehicle Policy 2019	11
	Cycle Tests and Model Examination	07
	Total	64

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 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 also air quality. Tamil Nadu is one of the most advanced states in India. Tamil Nadu has a highly developed industrial eco-system and is very strong in sectors like automobiles and auto-components. Many globally renowned companies have setup their manufacturing facilities in Tamil Nadu. Due the rapid depletion of fossil fuel and increase in fuel cost, environmental pollution, the shift to clean transport is necessary. This subject 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 andImpacts
- To appreciate the Electric Mobility Policy Frame work India and EV PolicyTamil Nadu 2019

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**Environmental impact and history:** Environmental impact of conventional vehicle - Air pollution — Petroleum resources — History of Electric vehicles & Hybrid Electric Vehicles - Conventional drive train system — Rear Wheel, Front Wheel and All wheel - Parts of Drive train system Types of Electric Vehicles: Introduction to Battery Electric Vehicle (BEV) – Definition BEV – Necessity BEV – Different between BEV and Conventional Vehicle - Advantages of BEV - Block diagram of BEV — Hybrid electric Vehicle(HEV) - Plug-in Hybrid Electric Vehicle (PHEV) — Fuel Cell ElectricVehicle (FCEV) – Description.	12
II	**Electric Vehicles:** Configurations of Electric Vehicle – Performance of Electric Vehicles – Tractive Effort in Normal Driving – energy consumption. Hybrid Electric Vehicles: Concept of Hybrid electric drive trains — Architecture of Hybrid Electric Drive trains – Series, Parallel and Series &Parallel Electric Propulsion Systems: Types of EV motors - DC motor drives– Permanent Magnetic Brush Less DC Motor Drives (BLDC) – Principles, Construction and Working – Hub motor Drive system — Merits and Demerits of DC motor drive, BLDC motor drive	12

III	**Energy Storages:** Electrochemical Batteries — Battery Technologies — Construction and working of Lead Acid Batteries, Nickel Based Batteries and Lithium Based Batteries - Role of Battery Management System (BMS)– Battery pack development Technology– Cell Series and Parallel connection to develop battery pack. Charging: Battery Charging techniques - Constant current and Constant voltage, Trickle charging – Battery Swapping Techniques – DC charging – Wireless charging – Maintenance of Battery pack – Latest development in battery chemistry. Effects and Impacts: Effects of EV – Impacts on Power grid – Impacts on Environment – Impacts on Economy.	15
IV	**Electric Mobility Policy Frame Work:** Government of India Electric Mobility Policy Frame work – Global Scenario of EV adoption – Electric mobility in India – National Electric Mobility Mission Plan 2020 – Action led by Original Equipment Manufacturers – Need of EV Policy – Advantage of EV Eco system – Scope and Applicability of EV Policy — ARAI Standards for Electric Vehicle – AIS 038, AIS 039 &AIS 123 - Key Performance Indicator - Global impact – Trends and Future Developments	11
V	**Tamil Nadu E-Vehicle Policy 2019** Tamil Nadu E-vehicle Policy 2019: Vehicle Population in Tamil Nadu – 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 – Research &Development and Business Incubation – Recycling Ecosystem – Battery and EVs	11

Reference 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
3. A Comprehensive Study of Key Electric Vehicle (EV) Components, Technologies, Challenges, Impacts, and Future Direction of Development (MDPI), Fuad Un-Noor, Sanjeevikumar Padmanaban, Lucian Mihet-Popa,Mohammad Nurunnabi Mollah and Eklas Hossain.
4. Electric Vehicles: A future Projection CII October 2020 report.
5. Design and analysis of aluminum/air battery system for electric vehicles,Shaohua Yang, Harold Knickle, Elsevier.
6. Propelling Electric Vehicles in India, Technical study of Electric Vehicles andCharging Infrastructure
7. ZERO EMISSION VEHICLES (zevs): TOWARDS A POLICY FRAMEWORK NTI Aayog.
8. FASTER ADOPTION OF ELECTRIC VEHICLES IN INDIA: PERSPECTIVEOF CONSUMERS AND INDUSTRY, The Energy and Resources Institute, New Delhi.
9. India EV Story: Emerging Opportunities by Innovation Norway.
10. Automotive Industry Standards – AIS 038, AIS 039 & AIS 123 – Manual

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4304 Term : IV

Course Name : ELECTRICAL MACHINES AND INSTRUMENTATION LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4304	-	5	3	80	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Circuit diagram	30
2	Connections and proceeding the Experiment	30
3	Reading/calculation/graph/result	30
4	Viva Voce	10
5	TOTAL	100

RATIONALE

In Electrical Machine-II, the students have been imparted with the theoretical knowledge of different electrical machines. Keeping in view of practical knowledge the syllabus of Electrical Machines Lab has been preferred. So that it may bring boldness and confidence in the students regarding the actual working of Electrical machines.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Run the alternator and to determine the regulation by synchronous impedance method.
- Determine the load characteristic of Single Phase and three Phase alternator.
- Run and synchronize two alternators by lamp & synchroscope method.

- Determine ‘V’ and ‘Inverted-V’ curve of 3 phase synchronous motor.
- Run and conduct load test on Single Phase I.M., 3 Phase Cage I.M. and Slipring I.M.
- Draw equivalent circuit of an IM, by conducting No load & Blocked rotor test.
- Develop Circle diagram of three phase Induction motor
- Determine the unknown inductance by using Anderson bridge
- Determine the unknown capacitance by using Schering bridge
- Calibrate the given Wattmeter, Single Phase energy meter and 3 Phase energy meter.
- Measure the earth resistance using earth tester kit.
- Measure the displacement using LVDT.
- Calibrate the load cell.

DETAILED SYLLABUS

Contents: Practical

Sl.No	List of Experiments
1	Predetermination of regulation of alternator by synchronous impedance
2	Load Test on three Phase Alternator
3	Synchronising of two alternators by lamp & synchroscope method.
4	Determination of V‘ Curve and inverted V‘ curves of a 3ø synchronous
5	Load test on a single phase induction motor and plot the performance
6	Load test on three phase induction motor and plot the performance
7	Equivalent circuit of a 3 phase Induction motor by conducting No load &
8	Circle diagram for 3 phases Induction Motor by conducting suitable Tests
9	Power factor improvement of 3 phases Induction Motor
10	Calibration of Ammeter, Voltmeter and Wattmeter.
11	Calibration of single phase energy meter by direct loading
12	Calibration of single phase energy meter by phantom loading
13	Calibration of 3 phase energy meter
14	Measurement of the earth resistance by using Megger / Earth tester kit.
15	Measurement of Displacement by LVDT
16	Measurement of Resistance, Inductance and Capacitance by Bridges
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 16 Questions.	

RESOURCE REQUIREMENT :

Sl.No	LIST OF EQUIPMENTS	Quantity Required
1	3 phase Alternator with prime mover	2
2	Synchronous Motor 3 / 5 HP (or more)	1
3	3 Phase Squirrel cage Induction motor 5 HP 440V/20A with loading arrangement	1
4	3 Phase Squirrel cage Induction motor 5 HP 440V/20A without loading arrangement	1
5	1 phase Induction motor 1 HP 230V/0.5A	1
6	3 phase Slip ring Induction motor 5HP 440V/20A	1
7	3 phase capacitor bank rating of 1KVAR, 400/440 V.	2
8	Synchronizing panel	2
9	AC Ammeter - Different ranges	10
10	DC Ammeter- Different ranges	6
11	AC Voltmeter - Different ranges	10
12	DC Voltmeter - Different ranges	6
13	Wattmeter - Different ranges	6
14	1 Phase Energy meter Calibration Induction Type	1
15	3 Phase Energy meter Calibration Induction Type	1
16	Single phase R.S.S meter	1
17	Earth Resistance Kit (Megger)	1
18	LVDT Kit to measure Displacement	1
19	Tachometer Analog / Digital	3
20	Synchroscope	1
21	Frequency meter	1
22	Phase Sequence Indicator	1
23	Wheatstone bridge	1
24	Anderson Bridge	1
25	Schering Bridge	1

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4305 Term : IV

Course Name : ANALOG & DIGITAL ELECTRONICS LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F4305	-	5	3	80	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Circuit diagram	25
2	Connection	30
3	Execution & handling of equipment	20
4	Output / result	15
5	Viva Voce	10
	TOTAL	100

RATIONALE

In this practical work, the student‘s knowledge about the Analog and Digital systems. They will become capable of developing and implementing Digital Circuits. They will also be able to acquire skills of operating A/D and D/A converters, counters and display system.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Build and test various applications of operational amplifiers.
- Familiarized with use of Digital ICs.
- Assemble and study the various multivibrator circuit and voltage regulator circuits.
- Construct and study different counter circuits using IC‘s.
- Know A/D & D/A conversions.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
1	Construct and test a) Inverting Amplifier and b)Non inverting amplifier using Op-AMP
2	Construct and test a) Scale changer circuit b) Summer circuit using Op.Amp.
3	Construct and test a) Differentiator circuit b) Integrator circuit using Op. Amp.
4	Construct and test a Astable Multivibrator using IC 555 and test its performance.
5	Construct and test a Monostable Multivibrator using IC 555 and test its performance.
6	Verify the truth table for the following gates AND, OR, NOT, NAND, NOR, EX-OR USING 74XX ICs.
7	Construct other gates using NAND gates.
8	Construct a Half Adder/Half Subtractor using 74XX ICs and verify its truth table
9	Construct Full Adder and verify the truth table using 74XX ICs.
10	Construct Full Subtractor and verify its truth table using 74XX ICs
11	Construct parity generator & parity checker circuit and verify its truth table using 74XX ICs.
12	Construct and verify the truth table of RS, D ,JK & T FFS
13	Construct a 4 bit BCD counter using 7473/7476 ICs and observe the output waveform
14	Construct a Decade counter using 7473/7476 ICs and observe the output waveform
15	Construct and verify the performance of a single digit counter with seven segment LEDs
16	Construct a 4 bit weighted Resistor D/A converter and test its performance.
17	Construct a 4 bit R-2R Ladder D/A converter and test its performance
18	Study and verification of the operation of ADC
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 18 Questions.	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F4306

Term : IV

Course Name : **CAD & SIMULATION LAB**

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction		Credit	Scheme Of Examination			
				Marks			Duration
	Hours / week	Hours / Term		Internal	End Exam	Total	
2F4306	4	64	3	25	100*	100	3

Scheme of Evaluation:

PART -A	Circuit Diagram (Manual Drawing)	10 Marks
	Development	10 Marks
	Simulation & Print out	20 Marks
PART -B	Symbols in CAD	10 Marks
	Circuit Diagram (GIVEN Drawing) (ACAD)	10 Marks
	Electrical Connection Diagram in CAD	20 Marks
	Print out	10 Marks
	Viva	10 Marks
TOTAL		100 Marks

RATIONALE

All the Engineering applications are simulated through computers. They are tested and then built using real components for commercial implementation. Simulation software‘s are 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. Also the students were trained to draw 2E diagrams using Auto CAD.

OBJECTIVES

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

- Know the various aspects of a 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
- To design and verify the results of various electric circuits using simulation software
- At the end of the semester the student must be able to draw
- 2D diagrams using Auto CAD
- The line diagrams of substations, The simple basic diagrams for laboratory circuits.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
	PART –A
A.1 : ELECTRICAL WIRING DIAGRAMS	
	ELECTRICAL SYMBOLS-DRAWING(5*2=10) 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

1	Draw the panel wiring diagram of two single phase alternators in parallel
2	Draw the winding diagram of lap connected DC armature with commutator connection and brush positions.
3	Draw the mush winding diagram of a three phase induction motor
4	Draw the control circuit of jogging.
5	Draw the Single Line Diagram of Intercom Arrangement in Multi-Storey Building.
6	Draw the connection diagram of ON load tap changer
7	Draw the Front End Schematic Diagram of typical Sub Switch Board (SSB).
8	Draw the connections of three point starter.
9	Draw the connections of automatic star - delta starter
10	Draw the Single Line diagram of Single phase MCB Distribution board.
11	Draw the Single Line diagram of three phase MCB Distribution board.
12	Draw the Single Line diagram of Lighting Distribution Board (LDB).
13	Draw the Single Line diagram of fire alarm riser arrangement in multi-storey building.
14	Draw the single line diagram of 110 KV / 11 KV receiving substation
PART –B	
ELECTRICAL CIRCUITS SIMULATION	
1	Step response of RL & RC series circuits
2	Verification of superposition theorem
3	Verification of Thevenin's and Norton's Theorem.
4	Simulation of half wave and full wave rectifier
5	Simulation of RLC series and parallel circuits
6	Simulation of single phase, half wave converter using SCR with R-load
7	Simulation of single phase, semi converter with RL load
8	Simulation of 6 step Voltage Source Inverter supplying R-load

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS
F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F0006 Term : IV

Course Name : UNIVERSAL AND HUMAN VALUES

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 13 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F0006	5	--	5	65	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education vehicles	12
II	Understanding Harmony in the Human Being - Harmony in Myself	12
III	Understanding Harmony in the Family and Society- Harmony in Human	11
IV	Personality Development and Leadership	11
V	Stress Management	12
	Cycle Tests and Model Examination	07
	Total	65

RATIONALE:

Holistic value-based education will focus on preparing graduates with these desirable attributes .

By way of: 1. Education on values, leading to the development of a holistic and humane world vision: • Universal Human Values of truth, love and compassion • Indian constitutional values of justice, liberty, equality and fraternity • Human rights, sustainable development and sustainable living as well as global well-being Universal Human Values (UHV Team) provides well-tested foundational inputs on value educationCourses, examples and case studies of local, regional and national values, languages and skills to reinforce and exemplify a holistic and humane world vision The Indian Knowledge System (IKS) is based on a deep understanding of human being as well as of the underlying harmony in nature and the entire existence. It has been tested through practice, verified and improved over thousands of years. As a result, the Indian Knowledge System is an effort for the 'wellbeing of all'. Therefore, IKS, its science, technology and systems offers many good case-studies of effort for human thought, culture, science, technology and systems

Objectives:

1. To help students distinguish between values and skills, and understand the need,basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they'really want to be' in their life and profession
3. To help students understand the meaning of happiness and prosperity for ahuman being.
4. To understanding the moral values that ought to guide engineering profession orpractice, resolving moral issues in engineering, and justifying the moral judgments in engineering.
5. To Understand the concept of values, meaning of stress, various causes ofstress and to manage stress.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**Course Introduction - Need, Basic Guidelines, Content and Process forValue Education** Purpose and motivation for the course, recapitulation from Universal Human Values-I - Self-Exploration – what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self- exploration - Continuous Happiness and Prosperity- A look at basic Human Aspirations - Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with theircorrect priority - Understanding Happiness and Prosperity correctly- A critical	12

	appraisal of the current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	
II	**Understanding Harmony in the Human Being - Harmony in Myself** Understanding human being as a co-existence of the sentient 'I' and the material 'Body'- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility-Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)- Understanding the characteristics and activities of 'I' and harmony in 'I'- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail- Programs to ensure Sanyam and Health.	12
III	**Understanding Harmony in the Family and Society- Harmony in Human** - **Human Relationship** Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship- Understanding the meaning of Trust; Difference betweenintention and competence- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship-Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co- existence as comprehensive Human Goals- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	15
IV	**Personality Development and Leadership** Introduction- Personality- Character- Determinants of Personality andCharacter Development - Measures to Develop the Personality - Measuresto Improve Character – leadership - leadership traits Senses of engineering -Variety of moral issues-Types of inquiries - Moral dilemma -Moral autonomy -Moral development (theories)- Consensus and controversy -Profession -Models of professional roles-Responsibility -Theories about right action (Ethical theories)- control -Self-interest – Customs -Religion -Self-respect -Case study: Choice of the theory	11
V	**Stress Management** Characteristics of Values- Meaning- Sources of Value Formation: Social institutions, Organisation, Colleagues, Work Need of studying values, Need for Studying Values- Stress -Meaning and Definition-	12

	Nature of Stress- Stress Level and Its Impacts- Causes of Stress- Stress Management- Individual Approaches- Organizational Approaches**.**	

ASSESSMENT:

- This is a compulsory credit course. The assessment is to provide a fair state ofdevelopment of the student, so participation in classroom discussions, etc. will be used in evaluation.

Example:

- Assessment by faculty mentor: 10 marks
- Socially relevant project/Group Activities/Assignments: 15 marks
- Semester End Examination: 100 marks
- Question Pattern for End semester is 50 MCQ.
- Each question carries 2 points (10 MCQ's from Each Unit)
- The overall pass percentage is 40%.

OUTCOME OF THE COURSE:

CO-1: Understand the significance of value inputs in a classroom and start applyingthem in their life and profession.

CO-2: Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of anindividual, etc.

CO-3: Understand the value of harmonious relationship based on trust and respectin their life and Profession.

CO-4: To facilitate the students in applying the understanding of harmony inexistence in their profession and lead an ethical life.

CO-5: To understand the individual and organizational strategies to manage stress.

Reference Books

1. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
2. The Story of Stuff (Book).
3. Small is Beautiful - E. F Schumacher.
4. Slow is Beautiful - Cecile Andrews
5. Economy of Permanence - J C Kumarappa
6. Bharat Mein Angreji Raj - PanditSunderlal
7. Rediscovering India - by Dharampal
8. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
9. India Wins Freedom - Maulana Abdul Kalam Azad
10. Vivekananda - Romain Rolland (English)
11. IES Master Institute of Engineering.

TERM – V

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5307 Term :: V

Course Name : POWER SYSTEM I

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5307	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Generation Of Electrical Power	16
II	A.C Transmission And HVDC Transmission	15
III	Line Insulators And Underground Cables	14
IV	Circuit Breakers And Over Voltage Protection	14
V	Protective Relays And Grounding	14
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

Power system comprises generation, transmission and distribution. In this course generation, transmission and distribution, types of generation schemes , transmission with transmission loss and efficiencies , different type of sub-stations , different type of distribution schemes, EHV AC and HVDC transmission, underground cable and

economics aspects involved are dealt with. Further types of tariff are briefly included to give brief and overall idea to the technicians.

In power stations and sub stations applications of switchgear and various protective schemes applied to various electrical equipment/ machines/ bus bars, feeders, transmission lines/ distribution lines etc. are essential to minimize normal and abnormal faults and for safety of human being. Safety is the major criteria of every power station and substation for machines/ equipment and human beings. Operating skill of switchgear and protective systems is much essential for the technician working in the particular work area.

Essential efforts are being made in this course to ensure that students develop skills in operating various controls and switchgear in power system. He/she needs to make remedial measures for faults/abnormalities in machines/equipment in power system using appropriate diagnostic instrument/devices.

OBJECTIVES

To understand

- Conventional Power Plants - layout, site.
- Non conventional power generation - methods.
- Grid system.
- Energy Conservation, Audit and Management AC transmission -supports, conductors, lines, effects.
- High Voltage DC transmission.
- Line insulators, UG cables.
- Fuse-types and their characteristics.
- Principle, types and location of current limiting reactors.
- Causes of over voltages & Methods of reducing over voltages.
- Operating principles, construction & applications of lightening arrestor.
- Insulation co-ordination & volt- time characteristic.
- Importance of Neutral Earthing, Methods, advantages & applications.
- Necessity & types of interruption devices like ACB, OCB, ABCB, SF6 and vacuum circuit breakers.
- Working principle and various types of circuit breakers Concept of protective relay and its selection.
- Classification of relays.

- Principle of working and operation of relays and their construction.
- Basic terms related to relay like pick up value, reset value- and operating current etc.
- Use the static relays in modern power system.
- Settings of various types of relays.
- Maintenance and testing of relays.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**GENERATION OF ELECTRICAL POWER** **1.1 Methods of Generation :** Introduction-Conventional methods of power generation -schematic arrangement and choice of site for Hydel, thermal, Nuclear power plants-Advantages and Disadvantages - Comparison of these power plants - Schematic arrangement of Diesel, Gas Turbine, Pumped storage schemes- Principle and types of co - generation **1.2 Economics of power Generation :** Grid or Inter connected system – Advantages - Load Transfer through Inter connector - Load curves and Load duration curves - connected load - Average load -Maximum Demand -Demand factor - Load factor - Plant Use Factor - Diversity factor - Plant capacity factor – Simple problems - Significance of high load & diversity factors - Load sharing between base load and peak load plants **1.3 Renewable Energy sources**- Basic principle of Solar Energy, Wind Power Generation-Hybrid Renewable Energy Systems.	15
II	**A.C TRANSMISSION AND HVDC TRANSMISSION** **2.1 A.C. Transmission conductors & Line supports :** Introduction-Typical Layout of A.C. Power supply scheme - Advantages and Disadvantages of A.C Transmission- High Transmission Voltage-Advantages-Economic choice of Transmission voltage-Elements of a Transmission Line - Over Head Line-Conductor materials and their properties-Line supports- Its properties - Types of supports and their applications-spacing between conductors-length of span	14

	2.2 Calculations in overhead lines : Sag in over head lines-Calculation of Sag- When the supports are at equal and unequal levels – Problems - constants of a Transmission line- Transposition of Transmission lines- Skin Effect- Ferranti Effect-Corona- formation and corona loss-Factors affecting corona- Advantages and Disadvantages-Classification of O.H. Transmission lines- performance of single phase short Transmission line - voltage regulation and Transmission Efficiency- Problems. **2.3 H.V.D.C Transmission:** Advantages and Disadvantages of D.C Transmission- Layout Scheme and principle of High Voltage D.C Transmission - D.C link configurations (monopolar, Bipolar and Homopolar) - HVDC convertor Station(Schematic diagram only)	
III	**LINE INSULATORS AND UNDERGROUND CABLES** **3.1 Line Insulators:** Introduction-Line Insulator materials-Properties of Insulators - Types- causes of failure of Insulators-Testing of Insulators-Potential Distribution over suspension Insulator string-String Efficiency - Methods of improving string Efficiency- Problems. **3.2 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 **-** Laying of underground cables-Direct laying, Draw-in- system - Advantages and Disadvantages **3.3 FACTS:** Definition-Need for FACTS controllers- types of FACTS controllers-SVS- STATCOM-UPFC (block diagram explanation only)	15
IV	**CIRCUIT BREAKERS AND OVER VOLTAGE PROTECTION** **4.1 Circuit Breakers:** Switch gear-Essential features of Switch gear-faults in a Power system (definition only). Basic principle of circuit Breaker -Arc Phenomenon- methods of Arc extinction-Arc voltage -Restriking 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 CBs - construction, working principle , Air Blast C.B, SF6 and vacuum C.B-ELCB, Residual current Circuit Breakers - Maintenance	14

	schedule for circuit breakers - D.C breaking - Problems of D.C breaking- Schematic for HVDC C.B- producing current zero. **4.2 Fuses:** Desirable characteristics-Fuse Element materials-current rating of fuse elements -fusing current-Cut off current-L.V fuses-Rewirable fuse, HRC cartridge fuse -H.V. fuses-cartridge type, liquid type and metal clad-fuses. **4.3 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.	
V	**PROTECTIVE RELAYS AND GROUNDING** **5.1 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 Directional and Non-directional), Differential relay **5.2 Static relays :** Basic elements of static relay - Over current, Distance Relays (Block Diagram explanation only) – Advantages, Disadvantages **5.3 5.3 Grounding: I**ntroduction - Equipment grounding - system grounding - ungrounded Neutral system - Necessity of Neutral grounding -methods - solid grounding, Resistance grounding - Reactance grounding, Resonant grounding.	15

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Principles of Power Systems 4th Edition Reprint 2007	VK. Mehta	S.Chand & Co New Delhi .

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	A Course in Electrical Power 2013 Edition, 2013	Soni , Gupta & Bhatnagar	Dhanpath Rai & Co (P) Ltd., New Delhi

2	Electrical Power System Re print-2009	S.L. Uppal	Khanna Publishers, New Delhi
3	A Course in Electrical Power 2013 Edition, 2013	J.P. Gupta	Kaison Publishing House, New Delhi
4	Electrical Power System, FourthEdition, 2009	CLWadhawa	New Age International, New Delhi
5	HVDC Power Transmission System & Technology, Reprint 2005	KR. Padiyar	New Age International, New Delhi
6	Digital Protection – Protective Relaying from Electromechanical to Microprocessor, Second Edition 1997	LP Singh	New Age International
7	Power System Protection and Switchgear, Reprint 2000	B Ram & DN Viswakarma	TMH 1995
8	Thyristor-Based Facts Controllers for Electrical Transmission Systems, 2005 Edition	Mohan Mathur.R., Rajiv. K.Varma,	IEEE press and John Wiley & Sons, Inc.,
9	Understanding FACTS - Concepts and Technology of Flexible AC Transmission Systems, 2001 Edition	Narain G. Hingorani, Laszio. Gyugyi	Standards publishers, New Delhi

ONLINE RESOURCES

www.nptel.ac.in/courses/108102047/ www.electrical4u.com/protection-system-in-power-system/ www.electrical4u.com/electrical-switchgear-protection/ www.electrical4u.com/electrical-power-transmission-system-and-network/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5308 Term : V

Course Name : CONTROL AND MAINTENANCE OF ELECTRICAL MACHINES

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5308	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Control Circuit Components	15
II	DC & AC Motor Control Circuits	14
III	Industrial Control	15
IV	Operation & maintenance of ac motors and starters	14
V	Operation & maintenance of transformer	15
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

In the present era, the students, after passing Diploma in Electrical Engineering, will be employed in different industries, board and railways etc., where they will have to deal with the different types of machines and control circuits. It is, therefore, very essential to impart the knowledge of control and maintenance of electrical machines in details, to the students for successfully discharging their duties.

OBJECTIVES

To understand

- Electrical control circuit elements including various types of industrial switches, industrial relays, industrial timers, solenoids, contactors and interlocking arrangements.
- DC motor control circuits for direction control, speed control, acceleration control, braking control and jogging using contactors.
- Speed control of dc motor using Electronic components.
- AC motor control circuits for direction control, speed control, acceleration, control, braking control and jogging using contactors.
- Transformer installation, protection, oil checking and maintenance.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**CONTROL CIRCUIT COMPONENTS** **1.1 Switches:** Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and Proximity switches. **1.2 Relays :** Voltage relay, dc series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer). Over current relay -Bimetallic thermal over load relay and Magnetic dash pot oil filled relay.. **1.3 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.	15
II	**DC & AC MOTOR CONTROL CIRCUITS** **2.1 DC Motor Control Circuits:** Current limit acceleration starters -Series relay and counter EMF starters - Definite Time acceleration starters. **2.2 AC Motor Control Circuits :** Motor current at start and during acceleration – No load speed and final speed of motor -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	14

	motor –Reversing the direction of rotation of induction motor –Plug stopping of the motor -Dynamic braking -Three step rotor resistance starter for wound induction motor - Secondary frequency acceleration starter	
III	**INDUSTRIAL CONTROL CIRCUITS** Planner machine — Contactor control circuit — Logic control circuit-- Skip hoist control Automatic control of a water pump — Control of electric oven — Control of air compressor - Control of over head crane — Control of conveyor system — Control of elevator — Trouble spots in control circuits — General procedure for trouble shooting.	15
IV	**OPERATION & MAINTENANCE OF AC MOTORS AND STARTERS** Change the direction of Rotation, Role of Single phase preventer, Types of enclosures, Permissible overload, effect of ambient temperature, Insulation classification, Indicating & Protecting devices for Large Size Motors, If overload mechanism trips frequently what action to be taken, Control devices for motors, role of relays in motor, Points to be attended during periodical maintenance, Air gap measurement, Ball & Roller bearing usage, precautions in fitting bearings, bearing problems, Alignment of directly coupled motors, Static and Dynamic balancing of rotor, Causes of low insulation resistance, rectification of low insulation resistance problem, drying out of motors, Step to be taken if a motor is unduly hot, Vacuum impregnation, Selection of starters for High/Low starting torque applications.	14
V	**OPERATION & MAINTENANCE OF TRANSFORMER** Forces generated in transformer during short circuit - Noise in operation – Reason for temperature rise- -insulation resistance-Drying out- precaution for paralleling transformer-inrush current and remedy-insulation co-ordination-effect on insulation during star point earthing –transformer maintenance schedule – action to be taken while transformer oil, temperature rises unduly – points to be checked by oil level tends to fall down – attention required for bushing and insulator	15

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Control of Electrical Machines 1st Edition 2006	S.K. Bhattacharya	New Age International

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Automation, Production System And Computer-Integrated Manufacturing 1st Edition 2016	Mikell P. Groover	Prentice Hall of India (P) Ltd., New Delhi
2	Control of Electrical Machines 1st Edition 1973	Irving L Kosow	Prentice Hall of India (P) Ltd., New Delhi
3	Electronic motor control 10th Edition 2014	Walter Alrich	Tarapoewala publications,MUMBAI

ONLINE RESOURCES

electrical-engineering-portal.com/download-center/books-and-guides/

www.electronics.wisc-online.com/category.aspx

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5402.1 Term : V

Course Name : MICROCONTROLLER AND ITS APPLICATIONS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5402.1	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Architecture of 8051 & their Pin details	15
II	Overview of 8051 Instruction Sets	14
III	Interrupts and Programming Examples	15
IV	Timer/Counter and Serial Communication:	14
V	Interfacing Techniques	15
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

Microcontrollers have also assumed great significance in the field of electronics and common goods industry, and thus considered to be an important field of engineering. This course aims to expose the students to both of these and give them adequate knowledge of these topics.

OBJECTIVES

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

- Understand the history and need of Microprocessor.
- Understand the internal architecture details of 8085 Microprocessor.
- Explain Architecture of 8051 Microcontroller & the functions of various registers.
- Understand interrupt structure of 8051.
- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes & Write simple programs using 8051.
- Understand the block diagram and control word formats for peripheral devices.
- Understand how to interface with RS232C.
- Understand how to interface with 8255.
- Understand various application of 8051 Microcontroller

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**ARCHITECTURE OF 8051 & THEIR PIN DETAILS** **1.1 Introduction To Microprocessor & Microcontroller** : Definition of microprocessor, microcontroller. Comparison of Microprocessor and Microcontroller -Features of microcontroller -Advantages of microcontroller -Applications Of microcontroller -Manufactures of microcontroller. Types of microcontroller. **1.2 Architecture of 8051** : Block diagram of Microcontroller – Functions of each block. Pin details of 8051 -Oscillator and Clock -Clock Cycle -State - Machine Cycle -Instruction cycle –Reset - Power on Reset - Special function registers : Program Counter -PSW register -Stack - I/O Ports . 1.3 **Memory Organisation:** ROM - RAM - Memory Organization of 8051,Interfacing external memory to 8051	15
II	**OVERVIEW OF 8051 INSTRUCTION SETS:** 2.**1 Assembler and Addressing Modes** : Instruction Format, Different addressing modes of 8051, Assembling and running an 8051 program -Structure of Assembly Language - Assembler directives. **2.2 Instruction Sets :** Classification of 8051 Instructions(based on	14

	Length) - Classification of 8051 Instructions(based on Function) .Data Handling instructions - Data transfer instructions - Arithmetic Instructions - Format of these instructions and examples **2.3 Logical Instructions & control instructions**: Logical instructions(byte Operands) , Branching instructions – unconditional & conditional jump instructions - Format of these instructions and examples	
III	**I/O , INTERRUPTS AND PROGRAMMING EXAMPLES:** **3.1 I/O : Bit addresses for I/O and RAM** - I/O programming - I/O bit manipulation programming - Bit Manipulation Instructions 3**.2 Interrupts & Interrupt handling** - Interrupts available in 8051,their vector addresses, Interrupt priority in 8051- Interrupt related SFRs: interrupt enable register (IE) Interrupt priority register (IP), Interrupt handling - Programming Timer Interrupts –Programming external hardware interrupts -Programming the serial communication interrupt (Basic Level) **3.3 Programs** : Multibyte Addition - 8 Bit Multiplication and Division - Biggest Number / Smallest Number - Ascending order / Descending order – Conversion Programs -HEX to BCD, BCD to HEX , Time delay routines .	15
IV	**TIMER/COUNTER AND SERIAL COMMUNICATION:** **4.1 Special function registers** : SFRs used for Timer/Counter - Timer 0 and Timer 1 registers - TCON register – TMOD register - SFRs used for Serial Communication - SCON register - SBUF register - PCON register . **4.2 Programming 8051 Timers/ Counter programming** : Different modes of Timer - Programming Modes - Mode 0,Mode 1, Mode 2 & Mode 3. Different modes of Counter - Programming Modes - Mode 0, Mode 1, Mode2 & Mode 3. Simple Programs (using mode 1 or mode 2) **4.3 Basics of Serial programming :** RS 232 Standards - 8051 - connection to RS 232 - 8051 Serial Communication Programming - Programming the 8051 to transfer data serially -Programming the 8051 to Receive data serially	14

V	**INTERFACING TECHNIQUES** **5.1 Programmable interface IC:** IC 8255 -Block Diagram -Modes of 8255 -CWR format - 8051 interfacing with the 8255. 5**.2 Interfacing circuits** : Relays and opto isolators –Sensor interfacing -ADC interfacing -DAC interfacing -Keyboard interfacing - Seven segment LED Display Interfacing - LCD display interfacing .5**.3 Microcontroller based Application** : Stepper Motor interfacing -DC motor interfacing PWM,. IoT basic concepts.	15

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	The 8051 microcontroller And Embedded Systems, 2nd Edition	Muhammad Ali Mazidi Janice Gillispie Mazidi	Prentice Hall of India (P) Ltd., New Delhi

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	8051 microcontroller Architecture, Programming & Applications 2nd Edition 1996	Kenneth J. Ayala	Penram International .
2	Using Assembly Language 3rd Edition 1992	Allen L.Wyatt Sr	Prentice Hall of India (P) Ltd., New Delhi

ONLINE RESOURCES

www.vssut.ac.in/lecture_notes/lecture1423813120.pdf

www.circuitstoday.com/8051-microcontroller

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5402.2 Term : V

Course Name : VLSI DESIGN

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5402.2	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit	Topic	Hours
I	Introduction To VLSI	15
II	Introduction To VHDL	14
III	Combinational Circuit Design	15
IV	Sequential Circuit Design	15
V	Programmable Logic Devices	14
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE:

Very Large Scale Integration technology, when especially used fordesigning digital systems, it is mandatory that the behavior of the required system to be described (modeled) and verified (simulated) before synthesis, translate the design into real hardware fabricationin the foundry (gates and wires).Hardware Description Language (HDL)allows designs to be described using any methodology- top down, bottom up approach. VHDL can be used to describe hardware at the gate level or in a

more abstract way. This course is to introduce the digital system design concepts through hardware description Language, VHDL programming, design flow of VLSI and architectures of CPLD, FPGA. It is mainly aimed at design of combinational and sequential functions and simulates or verifies their functionality using the Hardware description Language (HDL).

OBJECTIVES:

. On successful completion of the course, the students must be able to

- Understand the concepts of VLSI design process.
- Develop a VHDL code for combinational circuit
- Develop a VHDL code for sequential circuit.
- Explain the importance of PROM, PLA, and PAL.
- Differentiate PROM, PLA and PAL.
- Develop the circuit using PROM, PAL and PLA.
- Understand CPLD and FPGA hardware.
- Differentiate ASIC, CPLD, FPGA.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**INTRODUCTION TO VLSI** **Chapter: 1.1: NMOS,CMOS LOGIC** NOT, AND, OR, NAND, and NOR Gates using NMOS – NOT, AND, OR, NAND, and NOR Gates using CMOS – Implementation of logic function (SOP, POS) in CMOS. **Chapter: 1.2: VLSI DESIGN PROCESS** Different level of abstractions in VLSI design – steps involved in VLSI design process: Design Entry, Simulation, Synthesis, Placement and Routing – Layout rules, Stick diagram.	15
II	**INTRODUCTION TO VHDL** **Chapter: 2.1:INTRODUCTION** HDL – Different types of modelling – General format for VHDL program .	14

	Chapter: 2.2: VHDL STATEMENTS Syntax for process statement, if statement, if else statement, if elsif else statement, case statement –Syntax for signal declaration and signal assignment statement –Syntax for variable declaration and variable assignment statement, component declaration. **Chapter: 2.3: VHDL CODE EXAMPLE** VHDL code for Logic gates AND, OR, NOT, NAND, NOR gate and XOR gates.	
III	**COMBINATIONAL CIRCUIT DESIGN** **Chapter: 3.1: COMBINATIONAL CIRCUIT:** Half adder, Full adder, Half subtractor and Full subtractor – 4 to 1 Mux, 1 to 4 Demux, 4 to 2 Encoder, 2 to 4 decoder and comparator – Four bit Arithmetic adder – Four bit Arithmetic subtractor . **Chapter: 3.2: VHDL PROGRAM FOR COMBINATIONAL CIRCUIT:** VHDL program for Half adder, Full adder – VHDL program for Hall subtractor and Full subtractor – 4 to 1 Mux, 1 to 4 Demux, 4 to 2 Encoder, 2 to 4 decoder and comparator in VHDL – VHDL program for Four bit Arithmetic adder (structural) – VHDL program for Four bit Arithmetic subtractor (structural).	15
IV	**SEQUENTIAL CIRCUIT DESIGN** **Chapter: 4.1: SEQUENTIAL CIRCUIT** Flip-flops: D,JK and T Flip-flops – counters:3 bit up Counter,3 bit down counter and 3 bit up/down counter, Decade counter, ring counter and Johnson Counter. **Chapter:4.2: VHDL PROGRAM FOR SEQUENTIAL CIRCUIT:** VHDL program for D,JK and T Flip-flops with reset input, without reset input – VHDL program for 3 bit up Counter,3 bit down counter and 3 bit up/down counter, Decade counter, ring counter and Johnson Counter.	15
V	**PROGRAMMABLE LOGIC DEVICES** **Chapter: 5.1: PROM, PLA AND PAL**	14

	Introduction to PROM, PLA and PAL – Implementation of combinational circuits with PROM, PAL and PLA (upto4variables) – Comparison between PROM, PAL and PLA. **Chapter: 5.2: CPLD, FPGA AND ASIC** Architecture of Complex Programmable Logic device (CPLD) – Architecture of Field Programmable Gate Arrays (FPGA) – Introduction to Application Specific Integrated Circuit(ASIC) – Types of ASIC – ASIC design flow.	

Reference Books

1. "M.Morris Mano, Michael D Ciletti ""Digital Design" Pearson Education 2008.
2. "Bhasker J ""VHDL Primer" Prentice Hall India-2009.
3. "NEIL H.E.WESTE, KAMRAN ESRHAGHIAN" "Principles of CMOS VLSI design", Addison – Wesley professional, second edition 1994.
4. "Nigel P.Cook" "Digital Electronics with PLD Integration", Pearson 2000.
5. "Ashok K.Sharma" "Programmable Logic Handbook: PLDs, CPLDs, and FPGAs", Mcgraw-Hill,1998.
6. "Michael John Sebastian Smith" "Application Specific Integrated Circuits", Addison – Wesley professional, first edition 1997.

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5402.3 Term : V

Course Name : RENEWABLE ENERGY SOURCES

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5403.3	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit	Topic	Hours
I	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 & 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

Contents: Theory

Unit	Name Of The Topic	Hours
I	**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.	8 8
II	**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 - 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	7

	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.	8
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.	10 4
IV	**BIO – ENERGY** **BIOMASS RESOURCES**: Introduction – Photo Synthesis – Usable Forms of Bio Mass, Their Composition and Fuel 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 – Bio Diesel Production – Biomass Energy Scenario in India.	6 8
V	**GEOTHERMAL AND OCEANIC ENERGY GEO THERMAL ENERGY**: Energy inside the Earth – Uses of Geothermal Energy – Geothermal Wells – Potential in India - Types of Geothermal Heat Pump Systems - Types of Geothermal Power Plants. **OCEANIC ENERGY**: Ocean Energy Resources – Principle of Ocean Thermal Energy Conversion (OTEC) — Method of Ocean Thermal Electric Power Generation.	**7** **7**

TEXT BOOK

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

REFERENCE BOOKS

S.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 Weir A	EFN Spon Ltd.	1986
3	Non-Conventional Energy Resources	B.H.Khan	Tata Mc Graw Hill., New Delhi.	2nd Edn, 2009

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5309 Term : V

Course Name : CONTROL AND MAINTENANCE OF ELECTRICAL MACHINES LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5309	--	6	3	96	3	25	100*	100

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

Scheme Of Evaluation

Sl.No No	Description	Marks
1	Circuit diagram	30
2	Connection	20
3	Execution	30
4	Result	10
5	Viva Voce	10
	Total	100

RATIONALE

The purpose of this course is to provide the student with basic skills required to work in the industry. This course will provides the student a hands-on approach to various types of starters used for a motor and know the power and control circuit of various starters and braking methods will be used for AC and DC Motors.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Wire and test the control circuit for various types of starters.
- Perform breakdown test and acidity test on the given transformer oil.
- Wire and test the control circuit for various operations like jogging, reversing control and braking of Motors.
- Conduct test on speed control of DC motor using SCR.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
1	Perform breakdown test and determine the dielectric strength of
2	Conduct acidity test on transformer oil.
3	Test the timing characteristic of thermal over load relay
4	Remote and interlocking operation using push button and contactor.
5	Wire and test the control circuit for jogging in 3Φ Cage IM
6	Wire and test the control circuit for semi-automatic star-delta starter
7	Wire and test the control circuit for automatic star-delta starter using
8	Wire and test the control circuit for dynamic braking of 3Φ Cage IM.
9	Wire and test the control circuit for two speed pole changing motor.
10	Wire and test the control circuit for automatic Rotor resistance starter
11	Wire and test the control circuit for dynamic braking of DC Shunt Motor
12	Test the working of single phase preventer.
13	Wire and test the control circuit for Reversing control of 3Φ Cage IM
14	Wire and test the control circuit for automatic star-delta starter using pneumatic timer
15	Conduct test on speed control of DC motor using SCR
Note: Only one question will have to be answered by the students in the	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5310 Term : V

Course Name : WIRING, ESTIMATION & WINDING LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction		Credit	Scheme Of Examination			
	Hours / week	Hours / Term		Marks			Duration
				Internal	End Exam	Total	
2F5310	6	96	4	25	100*	100	3 Hours

*****Examination will be conducted for 100 Marks and it will be reduced to 75 Marks

Scheme Of Evaluation:

SL No.	Description	Time Duration	Marks
1	Only one question will have to be answered by the students in the examination BY LOT out of the total 14 Questions in PART-A,	2 Hrs	50
2	Writing two IE Rules Each 5 mark (Among 12 rules) 2x 5 = 10 marks		10
3	Writing complete Estimation with either or pattern.[Plan / Layout and assumptions made -10 marks Single line diagram, Calculations- 10 marks Material schedule with specification -10 marks	1 Hr	30
4	Viva Voce		10
5	TOTAL	3 Hrs	100

RATIONALE

The purpose of this course is to provide the student with basic skills required to work in the commercial wiring and winding industry and also the students are prepare estimate for commercial and industrial electrification schemes. This course will provides the student a handson approach

a) to learn various methods of wiring construction including running conduit, wire pulling, and termination.
b) to learn the size of wire for a particular winding application, methods of laying of wires, types of insulation used etc.
c) to learn the Knowledge of electrical engineering drawing, IE rules, different types of electrical Installation and their design considerations.
d) to design and prepare working drawing of different Installation projects.
e) understanding of the methods
f) procedure of estimating the material required
g) skill of preparing schedule of material

OBJECTIVES

After the completion of this laboratory, the student should be able to

- To execute a staircase wiring for G+3 floors.
- To control one emergency bell from three different places.
- To connect a 1 phase motor load with main switch, starter, MCB and run.
- To connect a 3 phase motor load with main switch, starter, ELCB and run.
- To connect a 3 phase Main Switch, DB with suitable load.
- To make 1 phase service main with necessary items.
- To develop the wiring circuit to control (on/off) lamps (Incandescent lamp, Fluorescent Lamp, Sodium vapour lamp, Mercury Lamp) with a provision of fuse/ MCB/ electronic choke /switches.
- To prepare a test board with series/ parallel connection testing provisions.
- To wind a small transformer and testing it.
- To design and wind the No-volt coil used in starters.
- To wind and Insert the coils for a given 3 phase induction motor and ceiling fan motor
- To give end connection for a 3 phase Winding study motor connection.
- To prepare a price list for various Electrical wiring items and other accessories.

- To prepare a note on various insulation materials used in motor winding.
- Define different types of Electrical Installation
- Interpret the Electrical Engineering Drawing
- State IE rules
- State and describe the basic terms, general rules, circuit design procedure, wiring design and design considerations of Residential/Industrial Installations.
- Explain the sequence to be followed in carrying out the estimate of Residential/Industrial Installations.
- Prepare detail estimate and costing of Residential/Industrial Electrical Installations.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
WIRING :	
1	Emergency alarm wiring with 3 Bells and 3 Push buttons.
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 Earth Leakage C.B to install
7	Wiring of sodium vapour and mercury vapour 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	Godown / Tunnel wiring using 4 Lamps.
WINDING:	
1	Design, construct and test a 230/12-0-12 volt, 500mA Transformer .

2	Design a No volt coil for a 230 /440 V AC cotactor.
3	Dismantling a faulty Ceiling Fan and identify the fault, run the fan, after rectifying the fault.

PART –B	
ESTIMATION:	
1	Wiring systems - Types of wiring - points to be considered for selection of wiring comparison - Considerations for selecting wire size - size of conductors / cable used for various installations
2	Indian Electricity Rules (1956)
	Rule 28 Voltage - Rule 30 Service Lines and apparatus on consumer premises. - Rule 31 Cut-out on consumers premises. -Rule 33 : Earthed terminal on consumer'spremises -Rule 43: Provision applicable to protective equipment - Rule 44: Instruction of restoration of person suffering from electric stock - Rule 46 Periodical inspections and testing of consumer's installation. Rule 47 Testing of consumer's installation - Rule 54 Declared voltage of supply to consumer.-Rule 56 Sealing of meters and cut-outs. -Rule 57 Meters, maximum demand indicators and other apparatus on consumer Premises.- Rule 79 Clearance from buildings of low and medium voltage lines and service lines.
3	Estimation for Residential Building
4	Estimation for small Industrial Load
5	Estimation for Irrigation pump load
6	Estimation for Street Lighting
7	Estimation for single phase service connection

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5403.1 Term : V

Course Name : MICROCONTROLLER & ITS APPLICATIONS LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5403.1	--	4	2	64	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum
1	Program	25
2	Hexa code conversion	30
3	Execution	15
4	Result with input and output tabulation	20
5	Viva Voce	10
	TOTAL	100

RATIONALE

The importance of the microcontroller based systems is well established. With the advent of microcontroller only the world of Digital Computer found its place in every sphere of our life. There are numerous application of this technology in the industries for control and efficient running of machineries. It is therefore essential that the students who read about this technology should also perform experiments to acquaint themselves with the actual working. The Assembly Language is to be introduced in this course for practice.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Write a Assembly language program to perform bit level arithmetic operations.
- Write a Assembly language program to perform multi bit level arithmetic operations
- Write a Assembly language program to perform code conversions.
- Write a Assembly language program to solving Boolean equation.
- Write a Assembly language program to interfacing relay, seven segment display, LCD display, 4x4 matrix key board ,ADC 0808 with 89C51.
- Write a Assembly language program to interfacing Stepper motor and DC motor with 89C51.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
PROGRAMMING	
1	Addition, Subtraction
2	Multi-byte addition
3	Multiplication and Division of two numbers
4	Finding the maximum number in an array
5	Arranging the given data in Ascending order
6	BCD to Hex conversion
7	Hex to BCD conversion
8	Hex to ASCII
9	Square Root of an given number
10	Greatest Common Divisor
11	Parity bit generation .
12	Program using timer / Counter..
INTERFACING WITH APPLICATION BOARDS:	
1	Digital I/O
2	Matrix keyboard
3	Seven segment LED displays
4	LCD Displays
5	Traffic light
6	8 bit ADC and 8 bit DAC
7	Stepper motor control
8	DC motor control
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 18(12+8) Questions.	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5403.2 Term : V

Course Name : VLSI DESIGN LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5403.2	--	4	2	64	3	25	100*	100

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

RATIONALE:

VHDL is a versatile and powerful hardware description language which isuseful for modeling digital systems at various levels of design abstraction.This language is mainly for describing the hardware. Execution of a VHDL program results in asimulation of the digital system allows us to validate the design prior tofabrication of Digital Integrated circuit. This practical will enable the students to have hands on experience in using FPGA kit. The students are exposed to do programming in VHDL.

OBJECTIVES:

The students will be able to

- Understand the use of VHDL statements by writing program in VHDL.
- Develop a VHDL code for any digital circuits.
- Understand the concepts of digital circuits / logic function by simulating VHDL programs through XILINX software.
- Understand the concepts of digital circuits by using FPGA kit.
- To know the usage of input switches, output LEDs and seven segment display in FPGA kit.

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
NOTE: Behavioral or structural model can be used for all experiments	
1	SIMULATION OF VHDL CODE FOR LOGIC GATES (AND GATE,OR GATE) Develop code for logic gates. Simulate the code in the software.
2	SIMULATION OF VHDL CODE FOR COMBINATIONAL FUNCTION Optimize a 4 variable combinational function (SOP), describe it inVHDL code and simulate it. Example:F=(0,1,4,5,8,9,12)insop
3	SIMULATION OF VHDL CODE FOR HALF ADDER AND FULL ADDER Develop code for half adder and full adder. Simulate the code in the software .
4	SIMULATION OF VHDL CODE FOR HALF SUBTRACTOR AND FULL SUBTRACTOR Develop code for half subtractor and full subtractor. Simulate the code in the software
5	SIMULATION OF VHDL CODE FOR SINGLE BIT DIGITAL COMPARATOR Develop Boolean expression for A>B, A=B, A<B, write a VHDL code and simulate the code in the software
6	VHDL IMPLEMENTATION OF 8 TO 1 MULTIPLEXER Develop the code for a 8 to 1 multiplexer and implement it in FPGA kit in which switches are connected for select inputs and for data inputs, a LED is connected to the output.
7	VHDL CODE FOR JK FLIPFLOP (SIMULATION/IMPLEMENTATION) Develop the code for JK flipflop and simulate using software or implement it in FPGA kit.
8	VHDL IMPLEMENTATION OF 1 TO 8 DEMULTIPLEXER Develop the code for a 1 t0 8 Demultiplexer and implement it in FPGA kit in which Switches are connected for select inputs and a data input, Eight LEDs are connected to the output of the circuit.
9	VHDL IMPLEMENTATION OF 7SEGMENTDECODER – BOOLEAN EXPRESSION Develop Boolean expression for 4 input variables and 7 output variables. Develop a seven segment decoder in VHDL for 7 equations. A seven segment display is connected to the output of the circuit. Four switches are connected to the input. The 4 bit input is decoded to7segment equivalent.

10	.VHDL IMPLEMENTATIONOF7SEGMENTDISPLAY - WITH COUNTER Design and develop a seven segment decoder in VHDL. Design and develop a 4 bit BCD counter, the output of the counter is given to seven segment decoder. A seven segment display is connected to the output of the decoder. The Display shows 0,1,2..9 for every one second
11	VHDL IMPLEMENTATION OF 8 TO 3 ENCODER Develop code for 8 to 3 encoder. There will be 8 switches and 3 LEDs in the FPGA kit. The input given from switches and it is noted that any one of the switch is active. The binary equivalent for the corresponding input switch will be glowing in the LED as output
12	VHDL IMPLEMENTATION OF 2 TO 4 DECODER Develop code for 2 to 4 decoder and implement it in FPGA kit in which 2 Switches are connected for inputs , four LEDs for output.
13	VHDL IMPLEMENTATION FOR BLINKING A LED Develop a VHDL Code for delay .Delay is adjusted in such a way that LED blinks for every 1 or 2 seconds
14	.VHDL IMPLEMENTATION FOR BLINKING AN ARRAYOFLEDS Design and develop a VHDL Code for 4 bit binary up counter. Four LEDs are connected at the output of the counter. The counter should up for every one seconds.
15	VHDL IMPLEMENTATION OF A SPELLER WITH AN ARRAY OF LEDS Design and develop VHDL Code for a 5 bit Johnson ring counter 4 bit The LEDs are connected at the output of the counter. The speller should work for every one seconds.

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5403.3 Term : V

Course Name : RENEWABLE ENERGY SOURCES LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5403.3	--	4	2	64	3	25	100*	100

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

Scheme Of Evaluation:

S.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**

Questions are generated for all students randomly. Students have to answer for their question

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

DETAILED SYLLABUS

Contents: Practical

Name of the topic	Exp. No	Experiment
Solar PV Module	1	Measurement of Solar Radiation
	2	I-V and P-V Characteristics of PV Module
	3	I-V and P-V Characteristics of PV Modules in Series
	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
Power flow calculation	8	Power flow calculation of standalone PV System for AC Load
	9	Power flow calculation of standalone PV system for DC Load
	10	Calculation of Maximum Power Point
Solar Thermal conversion	11	Direct type Solar Dryer
	12	Indirect type Solar Dryer
	13	Solar Water Heater
	14	Solar Cooker
	15	Solar Air Heater
Wind mill	16	Demo model of Wind Mill

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F5404 Term : V

Course Name : ENTREPRENEURSHIP & STARTUP

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F5404	4	--	4	64	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Entrepreneurship – Introduction and Process	10
II	Business Idea and Banking	10
III	Start Ups, E-Cell and Success Stories	10
IV	Pricing and Cost Analysis	10
V	Business Plan Preparation	10
	Field Visit for Case study	14
	Total	64

RATIONALE:

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration 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 start ups 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 ensure good means of living for every individual, provides jobs and develop 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 earningdignified means of living
- Know its contribution in and role in the growth and development ofindividual 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

DETAILED SYLLABUS

Unit	Name of the Topics	Hours
1	**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 • Ethical Entrepreneurship • Entrepreneurial Values and Attitudes • Motivation • Creativity • Innovation • Entrepreneurs - as problem solvers • Mindset of an employee and an entrepreneur • Business Failure – causes and remedies • Role of Networking in entrepreneurship	12
2	**Business Idea and Banking** • Types of Business: Manufacturing, Trading and Services. • Stakeholders: sellers, vendors and consumers and Competitors • E- commerce Business Models • Types of Resources - Human, Capital and Entrepreneurial tools and resources • Selection and utilization of human resources andprofessionals, etc. • Goals of Business; Goal Setting • Patent, copyright and Intellectual property rights • Negotiations - Importance and methods • Customer Relations and Vendor Management • Size and capital based classification of businessenterprises • Various sources of Information • Role of financial institutions • Role of Government policy • Entrepreneurial support systems • Incentive schemes for state government • Incentive schemes for Central governments	12

3	**Start ups, E-cell and Success Stories** • Concept of Incubation centre's • Visit and report of DIC , financial institutions and otherrelevance institutions • Success stories of Indian and global business legends • Field Visit to MSME's • Study visit to Incubation centers and start ups • Learn to earn • Startup and its stages • Role of Technology – E-commerce and Social Media • Role of E-Cell • E-Cell to Entrepreneurship	**12**
4	**Pricing and Cost Analysis** • Unit of Sale, Unit Price and Unit Cost - for single product or service • Types of Costs - Start up, Variable and Fixed • Income Statement • Cash flow Projections • Break Even Analysis - for single product or service • Taxes • Financial Business Case Study • Understand the meaning and concept of the term Cash Inflow and Cash Outflow • Price • Calculate Per Unit Cost of a single product • Operational Costs • Understand the importance and preparation of IncomeStatement • Prepare a Cash Flow Projection • Projections • Pricing and Factors affecting pricing. • Launch Strategies after pricing and proof of concept	**12**
5	**Business Plan Preparation** • Generation of Ideas. • Business Ideas vs. Business Opportunities • Opportunity Assessment – Factors, Micro and MacroMarket Environment • Selecting the Right Opportunity • Product selection • New product development and analysis • Feasibility Study Report – Technical analysis, financialanalysis and commercial analysis	**12**

	• Market Research - Concept, Importance and Process • Market Sensing and Testing • Marketing and Sales strategy • Digital marketing • Branding - Business name, logo, tag line • Promotion strategy • Business Plan Preparation • Social Entrepreneurship as Problem • Solving - Concept and Importance • Risk Taking-Concept • Types of business risks • Execution of Business Plan	

REFERNCE BOOKS:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, SahityaBhawan Publications, Agra - 282002
2. Dr. G.K. Varshney, Business Regulatory Framework , SahityaBhawan Publications, Agra - 282002
3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301
4. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and smallbusiness management, Pearson Education India, Noida - 201301
5. CharantimathPoornima M. Entrepreneurship Development and SmallBusiness Enterprises, Pearson Education, Noida - 201301
6. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301
7. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
8. Prasanna Chandra, Financial Management, Tata McGraw Hill educationprivate limited, New Delhi
9. I. V. Trivedi, RenuJatana, Indian Banking System, RBSA Publishers,Rajasthan
10. Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai -600018
11. RamaniSarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F0007 Term : V

Course Name : CONCURRENT CAREER DEVELOPMENT

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F0007	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	**National Integration and Awareness**	**15**
II	**Social Awareness and Community Development**	**15**
III	**Health and Hygiene**	**15**
IV	**Environmental awareness and Conservation**	**14**
V	**Traffic Control Organization**	**14**
	Cycle Tests and Model Examination	**07**
	Total	**80**

RATIONALE

Career Development or Career Development Planning refers to the process an individual may undergo to evolve their occupational status. It is the process of making decisions for long term learning, to align personal needs of physical or psychological fulfillment with career advancement opportunities. Career Development can also refer to the total encompassment of an individual's work-related experiences, leading up to the occupational role they may hold within an organization. Career Development can occur on an individual basis or a corporate and organizational level.

Objectives:

1. To promote harmony and the spirit of common brotherhood amongst allthe people of the country. To safe guard public property and abjure violence.
2. To develop the idea of ability and better thinking to work for the betterment of community.
3. To prevent illness and have positive health attitude, correct and complete knowledge of health is necessary.
4. To develop a world population that is aware of, and concerned about,the environmental and its associated problems
5. To provide for the safe, rapid, comfortable efficient, convenient, and environmentally compatible movement of people, goods, and services.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**National Integration and Awareness** Introduction – Importance of National Integration – Essence of national integration : Cultural Integration, Economic Integration, Political Integration, Religious Integration, Social Integration- Necessity of National Integration : Maintenance of peace and harmony, Growth and development of the nation, Law and Order, Culture and religious development, dignity and self respect, welfare and wellbeing of the people-Role of NCC in nation Building	15
II	**Social Awareness and Community Development** Need of social awareness – Types of Social Awareness : Empathy, Organizational awareness- Service – How to build Social Awareness – Aims ofSocial Awareness – Different Social Awareness Programmes – Aims of Community development – Different community awareness programmes	15
III	**Health and Hygiene** Introduction to the structure of the body – Personal hygiene - Food hygiene –water supply and its purification – Sanitisation – Waste Product/Refuse – Types of waste product – Sources of refuse – Collection and removal of refuse – Preventable diseases – Classification of disease – Preventive measures Yoga –Definition and meaning of Yoga-Principles of Yoga- Asana – Definition, Types, Benefits - Effect of various yogic practices on Respiratory and Circulatory system-Method of performing various asanas –Padmasana, Siddhasana, Gyan Muthra, Suryanamaskar.	15

	Physical and Mental heath – Elements of good health – Objectives and scopes of health education – Characteristics of healthy mind, Measures to secure mental health	
IV	**Environmental awareness and Conservation** Introduction- Human activities and the environment – Depletion and deterioration – Deforestation – Forest and wild life – Water Resources – GlobalWarming – Depletion of Ozone layer – Role of the NCC cadets towards the environment – Ecology – Definition and components Conservation of environment and ecology – Resource depletion – Resource pollution – Environmental damage – Environment, life and ecology –Conservation measures – Methods of managements and conservation of natural resources.	14
V	**Traffic Control Organization** Understanding Road Safety – Importance or road safety: Major causes of road accident – Role of Education sector in road safety – Role of general Community in road safety – Road Safety tips – Safety Devices – Safe and Responsible driving : Getting ready to drive before driving, Physical and mental alertness, Know your vehicle, Know your blind spots, Fasten Your seat belt, Turn on head lights at night and in poor light conditions – Driving License.	14

ASSESSMENT:

This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, etc. will be used in evaluation.

- Final marks = 25% of Assignment mark + 50% of Online exam mark
- (proctored) + 25 % of External exam (unproctored).
- Unproctored means candidate will be taking the exam from college.
- The overall pass percentage is 40%.

COURSE OUTCOME

CO1: Students to know the responsibility to see that injustice, inequality, oppression; exploitation, corruption, misuse of public money etc. are done away with. Students play a vital role in the society. They are the guardians offreedom, Justice, equality, ethics and social equilibrium.

CO2: To understand social and ethical norms for behavior, and to recognize family,school, and community resources and supports.

CO3: Students have the knowledge or skills to develop good personal hygiene habitson their own.

CO4: To understand the fragility of our environment and the importance of itsprotection.

CO5: The students will get a vast understanding on various traffic enforcementsrules and regulations.

Reference :

1. Cadet's Hand Book.
2. Public Health And Hygiene, Dr.Sudhar R.Wagh.
3. Question Answers Of Environment And Road Safety Awareness KindleEdition By Brijesh Pathak (Author) .
4. Environment And Road By Naresh Kumar (Author).
5. Traffic Safety And Environment: Conflict Or Integration Author Links OpenOverlay Panelburkhard E.Horn(Professor)A. Hh.Jansson.

TERM – VI

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6311 Term : VI

Course Name : POWER SYSTEM II

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6311	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Distribution	15
II	Industrial Drives	15
III	Electric Traction	15
IV	Illumination	14
V	Electric Heating And Welding	14
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

Importance of Electrical Engineering is well known. This subject deals with Distribution and utilization Electrical Energy at various levels. Industrial application of electrical engineering such as electrolysis and illumination, electrical heating, electrical welding, electrical traction and for electrical drives have been dealt vigorously in this paper. Students reading this paper will be well versed in primary application of electrical power in industries.

OBJECTIVES

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

- Network of Electrical distribution system and its components.
- Distinguish between various types of substations and bus bar arrangement
- Understand the characteristics of all types of motors together with various ratings, braking arrangements and their application
- select the proper drive for industrial application
- Gain knowledge about Electronic Traction system
- Draw speed time curves and solve problem on max speed
- Understand the concept of traction control methods of equipments
- Gain knowledge on illumination_ solve problem using laws
- Understand the concept various methods of electrical heating of furnace operations temperature control
- Gain knowledge on welding methods &control equipments

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**DISTRIBUTION** 1.1 SUBSTATION: Introduction-Sub stations-classification of sub stations-Indoor and outdoor S.S - Gas insulated S.S-comparisions-Layout110/11KV Substation and 11KV/400V Distribution Substation- substation equipments-Bus bar- Types of bus bar arrangement - Advantages and Disadvantages. 1.2 DISTRIBUTION: Distribution system-Requirements of a Distribution system-Parts of Distribution system-Classification of Distribution systems-comparison of different distribution systems (A.C and D.C) -A.C Distribution - Types- Connection schemes of AC Distribution system 1.3 A.C DISTRIBUTION CALCULATIONS - Calculation of voltage at load points on single phase distribution systems (With concentrated load only)- Distributor fed at one end, both ends and ring mains-problems- Three phase, four wire, Star connected unbalanced load circuit- Problems- Consequence of	15

	Disconnection of Neutral in three phase four wire system (illustration with an example)	
II	**INDUSTRIAL DRIVES** 2.1 TYPES OF DRIVES: Introduction - Electric drive - Advantages - Parts of Electric drives - Transmission of power - Types of Electric drives-Individual, group and multi motor drives - Advantages and disadvantages of Individual and group drive . 2.2 SELECTION OF DRIVES: 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 2.3 BRAKING: Features of Good Braking System- Types of Braking - Advantages of Electric Braking - Plugging, Dynamic and Regenerative Braking - As Applied to Various Motors.	15
III	**ELECTRIC TRACTION** 3.1 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, catenary 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. 3.2 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 3.3 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	15
IV	**ILLUMINATION** 4.1 DEFINITIONS: Introduction - Definition and units of different terms used in illumination - Plane Angle, Solid angle, Light,. Luminous flux, Luminous Intensity, Luminous Efficacy, Candle power, Lumen,	14

	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. 4.2 REQUIREMENTS OF GOOD LIGHTING SYSTEM: Laws of Illumination- Problems. Types of lighting schemes- Factors to be considered while designing lighting scheme- Design of lighting Scheme (Indoor and outdoor)- Problems- Lighting systems- Factory lighting, Flood lighting, Street lighting. 4.3 SOURCES OF LIGHT: Fluorescent Lamp , Sodium vapour lamp, High pressure mercury vapour lamp, induction lamps - Energy saving lamps (C.F.L and L.E.D lamps) - Stroboscopic Effect – Troubleshooting of Fluorescent Lamps -Energy saving consideration for fluorescent lamp - Limitation and Disposal Of C.F.L- Benefits of LED Lamps-Comparison of Lumen Output for LED, CFL and Incandescent Lamp.	
V	**ELECTRIC HEATING AND WELDING** 5.1 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 –Eddy current heating and Dielectric heating. 5.2 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. 5.3 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).	14

TEXT BOOK :

Sl.no.	Name Of The Book	Author	Publisher
1	A Course in Electrical Power 4th Edition 1971	J.B. Gupta	Katson Publishing House , New Delhi

REFERENCE BOOKS:

Sl.no.	Name Of The Book	Author	Publisher
1	Electric Power 5th Edition 1976	S.L. Uppal	Khanna Publishers, New Delhi
2	A course in Electric Power 9th Edition 1987	M.L.Soni, P.V.Gupta & U.S.Bhatnagar	Dhanpat Rai & Sons, New Delhi
3	Modern Electric Traction 3rd Edition Reprint 2013	H. Partab	Dhanpat Rai & Sons, New Delhi..
4	Electrical Power Distribution 6th Ed. 2011	A.S. Pabla	Tata Mc.Graw Hill , New Delhi.
7	Electric Drives:concepts and Applications , 2nd Ed. 2011	Vedam Subrahmanyam	Tata Mc.Graw Hill , New Delhi.
8	Utilization of Electric Power	N.V.Suryanarayana	Tata McGraw Hill Publishing Co, New Delhi

ONLINE RESOURCES

www.electrical4u.com/electrical-drives/

www.electrical-engineering-portal.com/download-center/books-and-guides/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6312 Term VI

Course Name : POWER ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6311	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Overview Of Power Electronics	12
II	Line Commutated Power Control Circuits	13
III	Forced Commutated Power Control Circuits	13
IV	Applications Of Power Electronics	13
V	Motor Drive Applications	12
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

Power Electronics plays a very vital role in the field of control engineering specifically in the modern industries as they mostly use electronic controls, which are more efficient, effective and precise as compare to the conventional methods. The concept of power electronics is to give broad base Knowledge of power Electronics and its industrial application. It encompasses the topics like power Semiconductor devices, SCR control Mechanism, Controlled rectifier, chopper, Inverter & Cycloconvertor. The industrial application will enable the students to gather knowledge of Industries & automation.

OBJECTIVES

On completion of this unit the student should be able to:

- Explain the characteristics of Thyristor family.
- Draw and explain the working of trigger circuits.
- Draw and explain the operation of commutation circuits.
- State the applications of trigger and commutation circuits.
- Familiarize the phase controlled rectifier
- Know the applications of the phase controlled rectifier
- Draw and describe the working of half wave controlled rectifier circuit with R and RL load
- Draw and explain the working of single phase semiconverter bridge and single phase full converter Bridge for RL load.
- Draw and explain the operation of single phase and three phase full converter with RL load
- Study the complete protection of converter circuits
- Understand the working choppers and inverters
- Describe the various methods of inverters with circuit diagram
- Understand the control of DC Drives
- Know the various methods of speed control of DC drives
- Learn the different types of power factor improvement in phase controlled converter
- Familiarize the control of DC and AC drives
- Know the torque - speed characteristics of three phase induction motor
- Study the speed control of three phase induction motor
- Understand the closed loop control of AC drive
- Know the operation of single phase and three phase cyclo converter

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**OVERVIEW OF POWER ELECTRONICS** **1.1 OVERVIEW OF POWER ELECTRONICS:** Power electronics-Definition -Scope Applications - Power Electronic Switch Specifications -Types of Power Electronic Circuits – Design of Electronics Equipment)- Power module - Intelligent module Silicon Controlled Rectifier - Forward Blocking Region - Forward Conducting Region -Reverse Blocking Region-Effect of dv/dt and Snubber -Effect of Rate of Rise in Current(di/dt)-Thyristor Ratings - Thyristor Gate Requirements - Triggering Circuits for Thyristor - Resistance Triggering Circuits- RC Trigger Circuits - UJT based Trigger Circuits-	12

	Driver and Buffer Circuits for Thyristor . Thyristor Commutation Techniques-Class A, B, Class C, Class D, Class E Types- Devices – MOSFET - IGBT – GTO	
II	**LINE COMMUTATED POWER CONTROL CIRCUITS** **2.1 LINE COMMUTATED POWER CONTROL CIRCUITS:** Line Commutated Converters(Controlled Rectifiers)- Principle of Phase Controlled Converter Operation - Single Phase Full Converters - Single Phase Dual Converters - Three Phase Full Converters - Three Phase Dual Converters - Pulse converters. AC Voltage Controllers-Principle of Phase Control - Single phase Bidirectional controllers with Resistive Load - Single Phase Controller with Inductive Load - Three Phase Full Wave Controllers - Cyclo Converters-Single Phase Cyclo Converters -Three Phase Cyclo Converters	13
III	**APPLICATIONS OF POWER ELECTRONICS** **3.1 FORCED COMMUTATED POWER CONTROL CIRCUITS :** DC-DC Switch-Mode Converters(Choppers)-Control of DC – DC Converter - Step-Down (BUCK) Converter - Continuous-Conduction Mode - Step-Up(BOOST) Converters - Continuous Conduction Mode – BUCKBOOST Converters – Continuous Conduction Mode - Cuk DC-DC Converters. DC-AC Switch-Mode Inverters-Pulse Width Modulated Inverters- Introduction - Principle of Operation - Single Phase Bridge Inverters - Three Phase Inverters - 1800 Conduction Mode - 1200 Conduction Mode - Voltage Control of Single Phase Inverters - Single Pulse Width Modulation - Multiple Pulse Width Modulation - Sinusoidal Pulse Width Modulation - Voltage Control of Three Phase Inverters - Sinusoidal PWM	13
IV	**APPLICATIONS OF POWER ELECTRONICS** **4.1 APPLICATIONS OF POWER ELECTRONICS :** Switch Mode Power Supplies - Full Bridge Converter type-Uninterrupted Power Supply - ON line(No Break) and OFF line(Short-Break) types - Static AC Circuit Breaker - AC Solid State Relays High Frequency Flourescent Lighting - Induction Heating - Electric Welding	13

	- High Voltage DC Transmission - Wind and Small Hydro Interconnection - Static VAR Compensators - Thyristor Controlled Inductors -Thyristor Switched Capacitors	
V	**MOTOR DRIVE APPLICATIONS** **5.1 MOTOR DRIVE APPLICATIONS:** DC Drives-DC Motor with a Separately Excited Field Winding - Line Frequency Converters - Effect of Discontinuous Armature Current – Control of Adjustable Speed Drives - Switch-Mode DC-DC Converters Induction Motor Drives-Introduction - Basic Principle of Induction Motor Operation - Induction Motor Characteristics at rated(line) frequency and rated voltage - Speed Control by Varying Stator frequency and voltage- Torque-Speed Characteristics - Start-Up Considerations - Voltage Boost required at low frequencies - Induction Motor Capability below and above the rated speed - Variable frequency Converter Classifications - Variable frequency PWM-VSI Drives - Line frequency Variable-Voltage Drives - Reduced Voltage Starting(“Soft Start”) of Induction Motors -Speed Control by Static Slip-Power Recovery.	12

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Power Electronics 2nd Edition Reprint 2008	M.D. Singh K.B.Khanchandani	Tata McGraw Hill Publishing Company, New Delhi

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Power Electronics 3rd Edition,2004	Mohammed H.Rashid	New Age Publication.
2	Power Electronics 3rd Edition,2009	Mohan, Undeland, Riobbins.	Wiley India Edition. Media Enhanced
3	Power Electronics 4th Edition, 2011.	Dr.P.S.Bimbhra	Khanna Publishers.
4	Power Electronics 8th Reprint 2011	M.S.Jamil Asghar	PHI Learning Private Limited Eastern Economy Edition

ONLINE RESOURCES

www.nptel.ac.in/courses/108105066/

www.electrical4u.com/thyristor-silicon-controlled-rectifier/

www.electronics.wisc-online.com/category.aspx

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6405.1 Term : VI

Course Name : PROGRAMMABLE LOGIC CONTROLLER

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6405.1	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Architecture & Operation of Programmable Logic	15
II	I/O MODULES, Programming of PLC	14
III	PLC Programming -1 (applicable for Allen Bradley PLC)	15
IV	PLC Programming -2 (applicable for Allen Bradley PLC)	14
V	Networking & SCADA	15
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE

A diploma holder when employed in automated industrial process controls or in automated power station will be required to know the basics of Programmable Logic Controllers, their working and their programming. Hence this course aims to expose the students to Programmable Logic Controllers and give them adequate knowledge about PLC & SCADA.

OBJECTIVES

To understand

- Evolution, internal structure, interface modules, advantages & market available PLCs.
- Various types of input and output modules.
- Input sensors.
- Various PLC programming methods, basic instructions like
- ON, OFF, timer, counter, latched and unlatched outputs.
- Simple PLC ladder programs for starters, filling plants.
- PLC networking, industrial standard communication networks.
- SCADA system hardware and software.

DETAILED SYLLABUS

Contents: Theory

Unit	Name Of The Topic	Hours
I	**INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER** **1.1 INTRODUCTION TO PLC :** Evolution of Automation - Development of PLC - Requirements of PLC - Features of PLC - Advantages over relay logic - Components of PLC - Types of PLC - Specifications and criteria for selection of suitable PLC - PLC manufacturers 1.2 **ARCHITECTURE OF PLC :** Block diagram of PLC – principle of operation - CPU - Memory Organization - I/O modules - PLC scan - Power supplies to PLC **1.3 PLC PROGRAMMING LANGUAGES** -Standard languages- Ladder diagram(LD) - Function block diagram (FBD), Sequential function chart(SFC) - Statement List(STL), (each one example program) - Symbols of a PLC Input and Output contact graphical languages(IES) and Ladder methods - program format.	15
II	**I/O MODULES, Programming of PLC :** 2.**1 INPUT/OUTPUT MODULES :** Discrete input module -AC input module -DC input module – sinking and sourcing - sensor input - special input modules– Sensors -limit switch, reed switch, photo electric sensor, inductive proximity sensor. Discrete output module - TTL output module -Relay output –Isolated output module - surge suppression in output – Analog outputs -open collector output. **2.2 ADDRESSING SCHEMES & I/O COMMANDS**: Input Addressing	14

	scheme in important commercial PLCs. Output Addressing scheme in important commercial PLCs. Typical Numbering mode. Simple instructions -Programming NC and NO contacts EXAMINE ON and EXAMINE OFF instructions - online, offline methods–Latch and Unlatch outputs -pulse edge evaluation **2.3 LADDER DIAGRAM:** Ladder diagram of AND, OR, NOT, XOR, NAND AND NOR gate - Equivalent ladder diagram to demonstrates De Morgan's theorem, Ladder diagram practice for simple Logical expressions, Multiplexer and Demultiplexer.	
III	**TIMERS & COUNTERS (Applicable for Allen Bradley PLC)** **3.1 Timer :** Definition& Classification of a timer. Characteristics of PLC timer – Functions in a timer – resetting – retentive and non retentive functions and function block format . **3.2 Counter** : Operation of PLC counter- Counter parameters – Format of counter instructions & Data file. **3.3 Instructions Used In Timer & Counter** - on-delay and off-delay timer. (TON,TOF,RTO). Counter instructions (CTU, CTD) - UP/DOWN counters-Timer and Counter applications. Simple problems using Timer.	15
IV	**PLC ADVANCED INSTRUCTIONS** **(Applicable for Allen Bradley PLC)** **4.1 Advanced instructions :**Types of Instructions - Addressing data formats - Comparison Instructions - EQU,NEQ, LES, GRT, GRQ, & LIM. - Program control instructions **4.2 Data manipulating instructions** - Math instructions - Logic instructions -Data handling instructions - Format and simple examples **4.3 Ladder logic diagram** for DOL starter, Automatic Star-Delta Starter, Jogging operation of 3Φ IM, Forward and reversing operation of 3Φ IM, Fluid filling operation , EB To Generator Changeover System and 3 - floor Lift control system.	14
V	**Networking & SCADA** **5.1 Communication Interfaces :** Types of communication interface – parallel – serial interface. IEEE 488 bus, RS232 interface . **5.2 Networking : T**ypes of networking - network communications - principles - communication mode- simplex – Half duplex – full duplex. Network Topology- Bus Ring, Star and Tree. 5.3 **Supervisory Digital Control (SCADA)** - introduction and brief history of SCADA – Architecture of SCADA systems - SCADA Hardware and software- Application of SCADA systems (basic only), Relationship between PLC and SCADA	15

TEXT BOOK

Sl.No.	Title	Author	Publisher
1	Programmable Logic Controllers and Industrial Automation an Introduction, 4th reprint 2012	Madhuchandra Mitra Samarjit Sen Gupta	Penram International Publishing Pvt. Ltd

REFERENCE BOOKS

Sl.No.	Title	Author	Publisher
1	Introduction to Programmable Logic Controllers, 3rd Edition 2005	Gary Dunning	Thomson Delmar Learning
2	Programmable Logic Controller With Applications, 1st Edition 2004	Pradeep Kumar & Srivashtava	BPB
3	Technician's Guide to Programmable Controllers, 6th Edition 2012	Richard A. Cox	Vikas Publishing Houses

ONLINE RESOURCES

www.electronics.wisc-online.com/category.aspx

www.electrical-engineering-portal.com/

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6405.2 Term : VI

Course Name : BIO-MEDICAL INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6405.2	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	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
	Cycle Tests and Model Examination	07
	Total	80

RATIONALE:

Bio Medical 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 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

Contents: Theory

Unit	Name of the Topics	Hours
I	**BIO-ELECTRIC SIGNALS, ELECTRODES AND CLINICAL MEASUREMENT** **Chapter: 1.1: BIO-ELECTRIC SIGNALS AND ELECTRODES** Bio – Potential and Their Generation – Resting and Action Potential – Propagation of Action Potential. Electrodes – Micro – Skin Surface – Needle Electrodes. **Chapter: 1.2: CLINICAL MEASUREMENT** Measurement of Blood Pressure (Direct, Indirect) – Blood Flow Meter (Electro Magnetic& 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, Flurometry.	13
II	**BIO - MEDICAL RECORDERS** **Chapter: 2.1: ELECTRO CARDIOGRAPH (ECG)** Electro Cardiograph (ECG) – Lead System – ECG Electrodes – ECG Amplifiers – ECG Recording Units – Analysis of ECG Curves. **Chapter: 2.2: ELECTROENCEPHALOGRAPH (EEG)** Electroencephalograph (EEG) – 10-20 Lead System – EEG Recording Units – EEG Wave Types – Clinical use of EEG – Brain Tumor. **Chapter: 2.3: ELECTRO MYOGRAPH (EMG) AND ERG** Electro Myograph (EMG) – EMG Waves – Measurement of Conduction Velocity - EMG Recording Units – Electro Retino Graph (ERG)- ERG Recording Units, Audiometer - Principle – Types – Basics Audiometer Working.	15
III	**THERAPEUTIC INSTRUMENTS** **Chapter: 3.1: PACEMAKER AND DEFIBRILLATORS** Cardiac Pacemaker – Classification – External Pace Makers – Implantable Pacemaker – Programmable Pacemaker – Cardiac Defibrillators – Types – AC And DC Defibrillators -Heart Lung Machine With Block Diagram. **Chapter: 3.2: DIALYSIS AND ENDOSCOPES** Dialysis – Hemo Dialysis – Peritoneal Dialysis. Endoscopes Endoscopic Laser Coagulator and Applications **Chapter: 3.3: PHYSIOTHERAPY EQUIPMENT**	15

	Physiotherapy Equipment – Short Wave Diathermy – Micro Wave Diathermy – Ultrasonic Therapy Unit (Block / Circuit) – Ventilators – Types – Modern Ventilator Block Diagram.	
IV	**BIOTELEMETRY AND PATIENT SAFETY** **Chapter: 4.1: BIOTELEMETRY** Introduction to Biotelemetry – Physiological – Adaptable to Biotelemetry – Components of a Biotelemetry System – Application of Telemetry -– Tele-medicine - Introduction, Working, Applications. **Chapter: 4.2: 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 Electro Surgical Units – Burns, High Frequency Current Hazards, Explosion Hazards.	15
V	**MODERN IMAGING TECHNIQUES** **Chapter: 5.1: LASER** LASER Beam Properties – Block Diagram – Operation of CO2 And Ndyag LASER – Applications of LASER In Medicine. **Chapter: 5.2: OTHER IMAGING TECHINIQUES** 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

Reference Books

1. Leslie Cromwell –Fred j. Wibell, Erich A.P Feither – Bio Medical Instrumentation and Measurements, II Edition.
2. Jacobson and Webstar – Medicine and Clinical Engineering.
3. R.S .Khandpur – Hand book of Bio –Medical Instrumentation.
4. Kumara doss - Medical Electronics
5. B.R. Klin - Introduction to Medical Electronics.
6. Mandeep Singh Printice- Introduction to Biomedical Instrumentation - Hall India 2010.

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS
F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6405.3 Term : VI

Course Name : COMPUTER HARWARE AND NETWORKING

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6405.3	5	--	5	80	3	25	100*	100

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

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	Hours
I	Mother Board Components and Memory Storage Devices	13
II	I/O Devices and Interface	15
III	Maintenance and Trouble Shooting of Desk top and Mobile Phones	15
IV	Computer Network Devices and OSI Layers	15
V	802.X and TCP/IP Protocols	15
	Cycle Tests and Model Examination	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, Blue tooth and IP Connectors
- Understand the technology of high quality multiple color graphic output
- devices like Dot matrix, Inkjet, Laser, Line, MFP and computer system.
- Understand the operations to Power Supply devices. Know the use of
- diagnostic Software. Identify the major components of Laptop. Troubles shoot
- the problems in Laptop.
- Understand the concept of data communication.
- Discuss the advantages and disadvantages of different network topologies.
- Compare different network classifications based on different category.
- 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 with OSI model. Understand IP address concepts and TCP/IP suite.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**MOTHER BOARD COMPONENTS AND MEMORY STORAGE DEVICES** **Chapter: 1.1: INTRODUCTION:** Parts - Mother board, sockets, expansion slots, memory, power supply, drives and front panel and rear panel connectors – Hardware, Software and Firmware. **Chapter: 1.2: PROCESSORS:** Architecture and block diagram of multi core Processor(any one), Features of new processor(Definition only)-chipsets (Concepts only) **Chapter: 1.3: BUS STANDARDS** Bus Standards Overview and features of PCI, AGP, USB, PCMCIA, Processor BUS –High **Chapter: 1.4: PRIMARY MEMORY** Introduction-Main Memory, Cache memory – DDR2- DDR3, RAM versions – 1TB RAM – Direct RDRAM	13

	Chapter: 1.5: SECONDARY STORAGE Hard Disk – Construction – Working Principle – Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting. Troubleshooting hard disk drives. **Chapter: 1.6: REMOVABLE STORAGE:** CD&DVD construction – reading & writing operations; CD-R,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	
II	**I/O DEVICES AND INTERFACE:** **Chapter 2.1: Keyboard and Mouse:** Keyboard: Signals – operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard. Mouse- types, connectors, operation of Optical mouse and Troubleshooting. **Chapter 2.2: Printers:** Introduction – Types of printers– Dot Matrix, Laser, line printer, MFP (Multi Function Printer), Thermal printer - Operation – Construction – Features and Troubleshooting **Chapter 2.3: I/O Ports:** Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fireware, Signal specification problems with interfaces. **Chapter 2.4: Displays and Graphic Cards** Panel Displays– Principles of LED, LCD and TFT Displays. SVGA Port signals – common problems and solutions. **Chapter 2.5: Power Supply:** SMPS: Principles of Operation and Block Diagram of ATXPower Supply, connector specifications	15
III	**BIOS, POST AND MOBILE PHONE SERVICING** **Chapter: 3.1: BIOS:** Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup. **Chapter: 3.2: POST:** Definition – IPL hardware – POST Test sequence – beep codes and error messages. **Chapter: 3.3: MOBILE PHONE COMPONENTS:** Basics of mobile communication. Components - battery- antenna- ear piece- microphone -speaker buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones. **Chapter: 3.4: TOOLS & INSTRUMENTS USED IN MOBILE SERVICING:**	15

	Mobile servicing kit – soldering and de-soldering components using different soldering tools - Use of multimeter and battery booster. **Chapter: 3.5: INSTALLATION & TROUBLESHOOTING**: Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions. **Chapter: 3.6: SOFTWARE AND ANTIVIRUS**: Flashing- Formatting- Unlocking –Use of secret codes- Downloading- Routing; Mobile Viruses – Precautions – Antivirus Software.	
IV	**COMPUTER NETWORK DEVICES AND OSI LAYERS** **Chapter: 4.1: 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. **Chapter: 4.2: TYPES OF NETWORKS:** LAN – MAN – WAN – CAN – HAN – Internet – Intranet –Extranet ,Client-Server, Peer To Peer Networks. **Chapter: 4.3: TRANSMISSION MEDIA:** Classification of transmission media -Guided – Twisted pair, Coaxial, Fiber optics; Unguided – Radio waves – Infrared – LOS – VSAT – cabling and standards. **Chapter: 4.4: NETWORK DEVICES:** Features and concepts of Switches –Routers(Wired and Wireless) – Gateways. **Chapter: 4.5: NETWORK MODELS:** Protocol definition - standards - OSI Model – layered architecture – functions of all layers.	15
V	**802.X AND TCP/IP PROTOCOLS** **Chapter: 5.1: OVERVIEW OF TCP / IP** OSI & TCP/IP – Transport Layers Protocol – connection oriented and connectionless Services – Sockets – TCP & UDP. **Chapter: 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 **Chapter: 5.3: NETWORK LAYERS PROTOCOL**	15

	IP –Interior Gateway Protocols (IGMP, ICMP, ARP, RARP Concept only). **Chapter: 5.4 IP ADDRESSING** Dotted Decimal Notation –Subnetting & Super netting – VLSMTechnique-IPv6 (concepts only) **Chapter: 5.5: APPLICATION LAYER PROTOCOLS** FTP– Telnet – SMTP– HTTP – DNS – POP	

Reference Books

1. Achyut Godbole , Computer Networks,Tata Mc-Graw Hill - New Delhi

2. Kaveh Pahlavan and Prashant krishnamoorthy, Principles of Wireless Networks–

A unified Approach, Pearson Education, 2002

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6313 Term : VI

Course Name : POWER ELECTRONICS LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6313	--	6	3	96	3	25	100*	100

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

DESCRIPTION AND ALLOCATION OF HOURS

SL.NO	Description	Hours
1	Circuit diagram	30
2	Connection	20
3	Execution	30
4	Result	10
5	Viva Voce	10
	Total	100

RATIONALE

On complication this Lab, the students will familiar with power electronics devices, different triggering circuit and application of SCR and other industrial application.

OBJECTIVES

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

- get the knowledge about the trigger circuit
- draw the input/output waveform using HCB and FCB
- know the performance of lamp control using DIAC-TRIAC
- learn the various techniques used for turn-off of Thyristor
- draw the waveform of series/parallel inverter
- draw the output waveform of DC chopper
- measure the output voltage of chopper
- find the performance of speed control of universal motor
- understand the concept of Closed loop control of AC motor
- know the performance of speed control of DC motor by varying firing angle
- understand the concept of Closed loop control of DC motor
- draw the output waveform of DC chopper using MOSFET/IGBT
- measure the variable output voltage using PWM technique

DETAILED SYLLABUS

Contents: Practical

SLNO	List of Experiments
1	Line synchronized, Ramp and Pedestal UJT trigger circuit with AC load
2	Single phase Half and Full Controlled Bridge with R load
3	Lamp control circuit using DIAC –TRIAC
4	SCR commutation circuits
5	Basic Series Inverter.
6	Single phase Parallel Inverter using MOSFET / IGBT
7	DC chopper control circuit using thyristor (any one).
8	Universal motor control circuit using TRIAC
9	Closed loop speed control of Single phase AC motor
10	DC shunt motor control circuit
11	Closed loop speed control of DC motor with loading arrangement
12	PWM based step down DC chopper using MOSFET/IGBT
13	Single phase Single pulse / Sinusoidal PWM inverter using
14	SMPS using MOSFET/IGBT
15	Three phase Half bridge / Full bridge Converter
Note: Only one question will have to be answered by the students in the	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6406.1 Term : VI

Course Name : PROGRAMMABLE LOGIC CONTROLLER LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6406.1	--	4	2	64	3	25	100*	100

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

Scheme Of Evaluation:

SLNO	Description	Maximum Marks
1	Ladder Logic diagram	25
2	I/O Addressing, Wiring Diagram and Connection	30
3	Execution	15
4	Result	20
5	Viva Voce	10
	TOTAL	100

RATIONALE

The purpose of this course is to provide the student with basic skills required to work with the various types of PLC‘s. This course will provides the student a hands-on approach to conversion of many conventional control circuits into PLC control circuit. Also the students will exposure into various methods of programming used for PLC.

OBJECTIVES

After the completion of this laboratory, the student should be able to

- Implement a ladder logic program approach to various logic gates, verification of Demorgan‘s Theorem and demonstration of Multiplexer and De-Multiplexer .
- Implement a ladder logic program approach to the control circuit for various operations like jogging, reversing control and braking of Motors.
- Implement a ladder logic program approach to the control circuit for various types of starters.
- Implement a ladder logic program approach for load shedding of transformer

DETAILED SYLLABUS

Contents: Practical

SN	List of Experiments
1	Write and implement a ladder logic program to demonstrate a) NAND Gate b) NOR Gate c) EX-OR Gate and d) EX-NOR Gate with PLC.
2	Write and implement a ladder logic program to demonstrate Demorgan‘s Theorem using PLC
3	Write and implement a ladder logic program to demonstrate Multiplexer and De-Multiplexer using PLC
4	Write and implement a ladder logic program for DOL Starter using PLC
5	Write and implement a ladder logic program for Semi Star-Delta Starter using PLC.
6	Write and implement a ladder logic program for Automatic Star-Delta Starter using PLC
7	Write and implement a simple ladder logic program for interfacing a lift control with PLC.
8	Write and implement a simple ladder logic program for interfacing a conveyor control with PLC
9	Write and implement a ladder logic program for Jogging operation of three phase Induction Motor using PLC.
10	Write and implement a ladder logic program for reversing operation of three phase Induction Motor using PLC.
11	Write and implement a ladder logic program for level control system of a Water Tank using PLC

12	Write and implement a ladder logic program for a bi-directional movable arm using PLC.
13	Write and implement a ladder logic program for blinking indicator circuit in which two lights are flashed alternately every 5 seconds using PLC.
14	Write and implement a ladder logic program that will control a stepper motor so that it moves 10 steps forward, waits for 20 seconds, and then cause the motor to move 10 steps in the reverse direction using PLC
15	Write and implement a ladder logic program for load shedding of transformer.
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 15 Questions.	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6406.2 Term : VI

Course Name : BIO-MEDICAL INSTRUMENTATION LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6406.2	--	4	2	64	3	25	100*	100

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

RATIONALE:

Recent advances in Medical Field have been fuelled 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 Health Care 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 Care 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

Contents: Practical

SN	List of Experiments
1	Construction and Testing of Differential amplifier.
2	Construction and Testing of Instrumentation amplifier
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 high gain amplifier.
8	Measurement of Body and Skin temperature.
9	Study, handle and use the following Instruments/Equipments: (i) Cardiac monitor. (ii) ECG stimulator. (iii) Muscle stimulator. (iv) Vascular Doppler recorder. (v) Pressure plethysmograph. (vi) Skin sympathetic response meter
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 15 Questions.	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6406.3 Term : VI

Course Name : COMPUTER HARWARE AND NETWORKING LAB

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6406.3	--	4	2	64	3	25	100*	100

* Examinations will be conducted for 100 marks and it will be reduced to 75 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 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, SMPS, motherboard, connectors and various disk drives used in Computers. .
- Install various secondary storage devices with memory partition and formatting.
- Acquire the practical knowledge about the installation of various devices like printer, scanner, web camera and bio-metric devices.

- Assemble PC system and laptop and checking
- Install Dual OS in a system.
- Enable to perform different cabling in a network.
- Configure Internet connection and able to debug network issues.

DETAILED SYLLABUS

Contents:Practical

SN	List of Experiments
Part A – Computer Hardware servicing	
1	**IDENTIFICATION OF SYSTEMLAYOUT** i) Identify front panel indicators & switches and Front side & rear side connectors ii) Familiarize the computer system layout by marking positions of SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards.
2	**HARD DISK** i) Configure bios setup program and troubleshoot the typical problems using BIOS utility. ii) Install, Configure, Partition and Format Hard disk.
3	**DVD/BLU-RAYWRITER** i) Install and Configure a DVD Writer and record a blank DVD. ii) Install and Configure a Blu-ray Writer and record a blank Blu-ray Disc.
4	**Printer Installation** i) Install and configure Dot matrix printer ii) Install and configure Laser printer
5	i) Install and configure Scanner ii) Install and configure Web cam and bio-metric device
6	i) Assemble a system with add on cards and check the working condition of the system ii) Install OS in the assembled system
7	Install Dual OS in a system
8	i) Assemble and Disassemble a Laptop to identify the parts. ii) Installation of different device drivers and Installation of different Application Software.
Part B – Computer networking	
9	Do the following Cabling works for establishing a network i) Crimp the network cable with RJ 45 connector in Standard cabling mode and cross cabling mode. ii) Test the crimped cable using a cable tester
10	Use IPCONFIG, PING, TRACERT and NETSTAT utilities to debug the network issues.

11	Interface two PCs to form Peer To Peer network using the connectivity devices Switch or Router in a LAN.
12	Share the files and folders in a LAN ii) Share a printer in a LAN.
13	Remote Desktop, Remote Assistance, Telnet, HyperTerminal, TeamViewer
14	Configure DNS to establish interconnection between systems and describe how a name is mapped to IP Address
15	i) Install and configure Network Devices: HUB, Switch (4/8/16/24 ports),Routers ii) Install and Configure NIC.
Note: Only one question will have to be answered by the students in the examination BY LOT out of the total 15 Questions.	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING SYLLABUS

F-SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

Programme Name : ELECTRICAL AND ELECTRONICS ENGINEERING

Course Code : 2F6407 Term : VI

Course Name : PROJECT WORK AND INTERNSHIP

TEACHING AND SCHEME OF EXAMINATION

No of weeks per term: 16 weeks

Course Code	Instruction periods per week		Credit	Total Periods per term	Scheme Of Examinations			
	Theory	Practical			Duration (Hrs)	Internal Assessment Marks	End Exam Marks	Total Marks
2F6407	--	6	3	96	3	25	100*	100

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

RATIONALE:

This subject 'Project Work and Internship" is the continuation of the previuos semester subjects. The students are to implement the detailed project plan, which they have prepared. This project are generally an integration of the various types of skills acquired during their course of study. Hence it is essential that students are given opportunity to develop and integrate the highly essential industry oriented competencies and skills. This subject build up greater confidence to face in the world of work.

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment.
- Implement the planned activity as a team.
- Take appropriate decisions on collected information. Carryout cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part ofthe Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The** Project work must be 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 and Internship:

Project Review I	. . .10 marks
Project Review II	. . .10 marks
Attendance	. . . 05 marks
Total	. . .**25 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 and Internship in BoardExaminations:

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 75 marks

a) 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 Centres / Institutions / Schemes.

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