CENTRAL POLYTECHNIC COLLEGE, CHENNAI – 113 (Autonomous Institution)
DIPLOMA COURSES IN ENGINEERING / TECHNOLOGY
(SEMESTER SYSTEM)
(Implemented from 2016 – 2017)
C –SCHEME
REGULATIONS

1. Description of the Course:

a. Full Time (3 years)

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

b. Sandwich (31/2 years)

The Course for the Diploma in Engineering (Sandwich) shall extend over a period of three and a half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of the three year full time diploma course are being regrouped for academic convenience.

During 4th and /or during 7th semester the students undergo industrial training for six months / one year. Industrial training examination will be conducted after completion of every 6 months of industrial training.

c. Part Time (4 years)

The course for the Part Time Diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of the 3 year full time diploma courses are being regrouped for academic convenience.

*Each Semester will have 15 weeks duration of study with 35 hrs. / Week for Regular Diploma programme and 18 hrs. / Week (21 hrs. / Week 1 year) for Part ï Time Diploma programmes.

The Curriculum for all 6 Semesters of Diploma courses have been revised and the revised curriculum is applicable for the candidates admitted from the 2016ï 2017academic year onwards.

2. Conditions for Admission:

Condition for admission to the Diploma courses is as follows:

The candidate shall be required to have passed in the S.S.L.C Examination of the Board of Secondary Education, Tamilnadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in Tamilnadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, Tamilnadu.

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

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic) or (Vocational) courses mentioned in the Higher Secondary Schools in Tamilnadu affiliated to the Tamilnadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & should have studied the following subjects.

Sl. No.	Courses	H. Sc Academic	H. Sc Vocational	
		Subject studied	Subject studied	
			Related subjects	Vocational subjects
1	All the regular and Sandwich Diploma Courses	Mathematics, Physics & Chemistry	Mathematics, Physics & Chemistry	Related vocational subjects theory & practical

- For the Diploma Courses related with Engineering / Technology, the related/equivalent subjects prescribed along with Practical may also be taken for arriving the eligibility.
- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.
- *Candidates who have studied Commerce subjects are not eligible for Engineering Diploma courses.*

4. Age Limit: No Age limit.

5. Medium of Instruction: English.

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the diploma unless he / she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, Tamilnadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

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

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time (Lateral Entry)	2 Years	5 Years
Sandwich	3 ½ Years	6 ½ Years
Part Time	4 Years	7 Years

7. Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical subjects. The curriculum outline is given in Annexure ï I

8. Examinations:

Autonomous board examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Autonomous Board Examinations.

9. Continuous Internal Assessment:

A. For Theory Subjects:

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

i) Subject Attendance **5 Marks**

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

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

ii) Test # **10 Marks**

2 Tests each of 2 hours duration for a total of 60 marks are to be conducted.

Out of which the best one will be taken and the marks to be reduced to: **05 Marks**

The Test ï III is to be the Model test covering all the five units and the

marks so obtained will be reduced to : **05 Marks**

Total **10 Marks**

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit-I & II	End of 6th week	60	2 Hrs
Test II	Unit-III & IV	End of 12th week	60	2 Hrs
Test III	**Model Examination- Compulsory** Covering all the 5 Units. (Autonomous Board Examinations-question paper-pattern).	End of 15th week	75	3 Hrs

 # - From the Academic year 2016-2017 onwards.

Question Paper Pattern for the Periodical Test :(Test ï I & Test ï II)

With No Choice:

Part A Type questions: 8 Questions X 4 mark	é é	32 marks
Part B Type questions: 4 Questions X 7 mark	é é	28 marks
Total		**60 marks**

(or)

Suitable as per Question pattern

iii) Assignment **10 Marks**

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

All Test Papers and Assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:

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

a) Attendance (Award of marks as same as Theory subjects)	:	**5 Marks**
b) Procedure/observation and tabulation / Other Practical related Work	:	**10 Marks**
c) Record writing	:	**10 Marks**
TOTAL		**25 Marks**

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

10. Life and Employability Skill Practical:

The Life and Employability Skills Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering. Much Stress is given to increase the employability of students.

11. Project Work: …… 25 Marks

The students of all the Diploma Programmes have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. 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.**

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

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

Proper record is to be maintained for the two Project Reviews, and it should be preserved for 2 semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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

Viva Voce	é	**30 marks**
Marks for Report Preparation, Demonstration &Presentation	é	**35 marks**
		……
Total		**65 marks**
		……

C) Written Test Mark (from 2 topics for 30 minutes duration) $:

ii)Environment Management	2 questions X 2 ½ marks	=	**5 marks**
iii)Disaster Management	2 questions X 2 ½ marks	=	**5 marks**
			……
			10 marks
			…….

$ - Selection of Questions should be from Question Bank, by the External Examiner. No choice need be given to the candidates.

Project Work & Viva Voce in Autonomous Board Examination	--	**65 Marks**
Written Test Mark (from 2 topics for 1 hour duration)	--	**10 Marks**
TOTAL	--	**75 Marks**

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

12. Scheme of Examination:

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

13. Criteria for Pass:

1. No Candidate shall be eligible for the award of Diploma unless he / she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the 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 subject if he / she secures not less than 40% in theory subjects and 50% in practical subjects out of the total prescribed maximum marks including both the Internal Assessment and the Autonomous Board Examinations marks put together, subject to the condition that he / she secures at least a minimum of 30 marks out of 75 marks in the Autonomous Board Theory Examinations and a minimum of 35 marks out of 75 marks in the Autonomous Board Practical Examinations.

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2019 onwards (Joined in first year in 2016 ï 2017) will be done as specified below.

First Class with Superlative Distinction:

A candidate will be declared to have passed in **First Class with Superlative Distinction** if he / she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 3/ 3 ½ / 4 years (Full Time / Sandwich / Part Time) without any break in study.

First Class with Distinction:

A Candidate will be declared to have passed in **First Class with Distinction** if he / she secures not less than 75% of the aggregate marks in all the semesters put together and passes all the semesters except the I and II semester in the first appearance itself and passes all subjects within the stipulated period of study 3/ 3 ½ / 4 years years (Full Time / Sandwich / Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he / she secures not less than 60% of the aggregate marks in all the semesters put together and passes all the subjects within the stipulated period of study 3/ 3 ½ / 4 years (Full Time / Sandwich / Part Time) without any break in study.

Second Class:

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

The above mentioned classifications are also applicable for the Sandwich / Part ï Time students who pass out Final Examination from October 2019 / April 2020 onwards (both joined in First Year in 2016 ï 2017)

15. Duration of a period in the Class Time Table:

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

16. Seminar:

For seminar the total seminar 15 hours (15 weeks x 1 hour) should be distributed equally to total theory subject per semester(i.e 15 hours divided by 3/4 subject). A topic from subject or current scenario is given to students. During the seminar hour students have to present the paper and submit seminar material to the respective staff members, who is handling the subject. It should be preserved for 2 semesters and produced to the flying squad and the inspection team at the time of inspections / verification.

Annexure – I

CURRICULUM AND SCHEME OF EXAMINATION

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

Full Time (1030)

'C' SCHEME

Total Curriculum Hours: 35 Hours / Week

Total Working Hours: 35 Hours / Week ï 15 Weeks / Semester

III SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC310	Electrical Circuit Theory	6	3	25	75	100	40
2	EEC320	DC Machines and transformers	5	3	25	75	100	40
3	EEC330	Electronic Devices and Circuits	5	3	25	75	100	40
4	EEC340	Electrical Circuits and Machines Practical	6	3	25	75	100	50
5	EEC350	Electronic Devices and Circuits Practical	6	3	25	75	100	50
6	EEC360	Electrical Wiring and Winding Practical	3	3	25	75	100	50
7	EEC370	Computer Applications Practical	3	3	25	75	100	50
		Seminar	1					
	Total		35		175	525	700	320

IV SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC410	AC Machines	5	3	25	75	100	40
2	EEC420	Measurements and Instrumentation	4	3	25	75	100	40
3	EEC430	Electrical Estimation and Energy Auditing	4	3	25	75	100	40
4	EEC440	Analog and Digital Electronics	5	3	25	75	100	40
5	EEC450	Electrical Machines & Instrumentation Practical	6	3	25	75	100	50
6	EEC460	Analog and Digital Electronics Practical	6	3	25	75	100	50
7	C0001	Life and Employability Skills Practical	4	3	25	75	100	50
		Seminar	1					
	Total		35		175	525	700	310

V SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC510	Generation, Transmission and Switch Gear	5	3	25	75	100	40
2	EEC520	Microcontroller and Embedded system	5	3	25	75	100	40
3	EEC530	Industrial Management and Entrepreneurship	4	3	25	75	100	40
4	**Elective theory -1**							
	EEC541	Control of Electrical Machines	5	3	25	75	100	40
	EEC542	Programmable logic controller						
	EEC543	Electrical Machine Design						
5	EEC550	Computer Aided Electrical Drawing Practical	3	3	25	75	100	50
6	EEC560	Microcontroller and Embedded system practical	6	3	25	75	100	50
7	**Elective Practical – 1**							
	EEC571	Control of Electrical Machines practical	6	3	25	75	100	50
	EEC572	Programmable logic controller practical						
	EEC573	Electrical Machine Design practical						
		Seminar	1					
	Total		35		175	525	700	310

VI SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC610	Distribution and Utilization	6	3	25	75	100	40
2	EEC620	Operation and Maintenance of Electrical Machines	5	3	25	75	100	40
3	**Elective theory II**							
	EEC631	Power Electronics & Drives	5	3	25	75	100	40
	EEC632	Bio medical Instrumentation						
	EEC633	Computer Hardware & Networking						
4	EEC640	Electrical Workshop Practical	3	3	25	75	100	50
5	EEC650	Electric Circuit and Simulation Practical	3	3	25	75	100	50
6	**Elective Practical II**							
	EEC661	Power Electronics & Drives Practical	6	3	25	75	100	50
	EEC662	Bio medical Instrumentation Practical						
	EEC663	Computer Hardware & Networking Practical						
7	EEC670	Project Work and Viva Voce	6	3	25	75	100	50
		Seminar	1					
	Total		35		175	525	700	320

Annexure – II

CURRICULAM AND SCHEME OF EXAMINATION

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

Part Time

'C' SCHEME

Total Curriculum Hours: 18 Hours / Week

Total Working Hours: 18 Hours / Week ï 15 Weeks / Semester

III SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC310	Electrical Circuit Theory	4	3	25	75	100	40
2	EEC320	DC Machines and Transformers	4	3	25	75	100	40
3	CBE15	Engineering Graphics I	3	3	25	75	100	40
4	EEC340	Electrical Circuits and Machines Practical	4	3	25	75	100	50
5	EEC360	Electrical Wiring and Winding Practical	3	3	25	75	100	50
	Total		18		125	375	500	220

IV SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC330	Electronic Devices and Circuits	4	3	25	75	100	40
2	EEC420	Measurements and Instrumentation	4	3	25	75	100	40
3	CBE26	Engineering Graphics II	3	3	25	75	100	40
4	EEC350	Electronic Devices and Circuits Practical	4	3	25	75	100	50
5	EEC370	Computer Applications Practical	3	3	25	75	100	50
	Total		18		125	375	500	220

V SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC410	AC Machines	4	3	25	75	100	40
2	EEC440	Analog and Digital Electronics	3	3	25	75	100	40
3	EEC430	Electrical Estimation and Energy Auditing	3	3	25	75	100	40
4	EEC450	Electrical Machines and Instrumentation Practical	4	3	25	75	100	50
5	EEC460	Analog and Digital Electronics Practical	4	3	25	75	100	50
	Total		18		125	375	500	220

VI SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC510	Generation, Transmission and Switch Gear	4	3	25	75	100	40
2	EEC520	Microcontroller and Embedded System	4	3	25	75	100	40
3	EEC550	Computer aided Electrical Drawing Practical	3	3	25	75	100	50
4	EEC560	Microcontroller and Embedded System Practical	4	3	25	75	100	50
5	C0001	Life and Employability Skill Practical	3	3	25	75	100	50
	Total		18		125	375	500	220

VII SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC530	Industrial Management and Entrepreneurship	4	3	25	75	100	40
2	EEC610	Distribution and Utilization	4	3	25	75	100	40
3	**Elective Theory I**							
	EEC541	Control of Electrical Machines	4	3	25	75	100	40
	EEC542	Programmable logic controller						
	EEC543	Electrical Machine Design						
4	EEC640	Electrical Workshop Practical	3	3	25	75	100	50
5	**Elective Practical I**							
	EEC571	Control of Electrical Machines Practical	3	3	25	75	100	50
	EEC572	Programmable logic controller practical						
	EEC573	Electrical Machine Design Practical						
	Total		18		125	375	500	220

VIII SEMESTER

Sl. No.	Subject Code	Name of the Subject	Total Hours per Week	Duration of Exam. Hours	Examination Marks			Minimum Marks for Pass
					Allocation of Marks			
					IA	BE	Total	
1	EEC620	Operation and Maintenance of Electrical Equipments	4	3	25	75	100	40
2	**Elective Theory II**							
	EEC631	Power Electronics & Drives	4	3	25	75	100	40
	EEC632	Bio medical Instrumentation						
	EEC633	Computer Hardware & Networking						
3	EEC650	Electric Circuit and Simulation Practical	3	3	25	75	100	50
4	**Elective practical II**							
	EEC661	Power Electronics & Drives Practical	4	3	25	75	100	50
	EEC662	Bio medical Instrumentation Practical						
	EEC663	Computer Hardware & Networking Practical						
5	EEC670	Project Work and Viva Voce	3	3	25	75	100	50
	Total		18		125	375	500	220

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

ALTERNATIVE SUBJECTS FOR "B" SCHEME TO "C" SCHEME

"B" Scheme		"C" Scheme	
Subject Code	**Subject**	**Subject Code**	**Subject**
III SEM (With effect from OCT'2017)			
EEB310	Electrical Circuit Theory	EEC310	Electrical Circuit Theory
EEB320	DC Machines and transformers	EEC320	DC Machines and transformers
EEB330	Electronic Devices and Circuits	EEC330	Electronic Devices and Circuits
EEB340	Electrical Circuits and Machines Practical	EEC340	Electrical Circuits and Machines Practical
EEB350	Electronic Devices and Circuits Practical	EEC350	Electronic Devices and Circuits Practical
EEB360	Electrical Wiring and Winding Practical	EEC360	Electrical Wiring and Winding Practical
B0003	Computer Applications Practical	EEC370	Computer Applications Practical
IV SEM (With effect from APR'2018)			
EEB410	AC Machines	EEC410	AC Machines
EEB420	Measurements and Instrumentation	EEC420	Measurements and Instrumentation
EEB430	Electrical Estimation and Energy Auditing	EEC430	Electrical Estimation and Energy Auditing
EEB440	Analog and Digital Electronics	EEC440	Analog and Digital Electronics
EEB450	Electrical Machines & Instrumentation Practical	EEC450	Electrical Machines & Instrumentation Practical
EEB460	Analog and Digital Electronics Practical	EEC460	Analog and Digital Electronics Practical
B0002	English Communication Practical	C0001	Life and Employability Skills Practical
V SEM (With effect from OCT 2018)			
EEB510	Power System I	EEC510	Generation, Transmission and Switch Gear
EEB520	Microcontroller and Embedded system	EEC520	Microcontroller and Embedded system

B0001	Entrepreneurial Development	-	No Alternate Subject
EEB541	Control of Electrical Machines(E I)	-	No Alternate Subject
EEB542	Electrical Machine Design(E I)	EEC543	Electrical Machine Design(E I)
EEB543	Bio-Medical Instrumentation(E I)	EEC632	Bio-Medical Instrumentation(E II)
EEB550	Electric Circuits Simulation Practical	EEC650	Electric Circuits Simulation Practical
EEB571	Control of Electrical Machines Practical(EP I)	-	No Alternate Subject
EEB572	Electrical Machine Design Practical (EP I)	EEC573	Electrical Machine Design Practical (EP I)
EEB573	Bio-Medical Instrumentation Practical(EP I)	EEC662	Bio-Medical Instrumentation (EP II)
VI SEM (With effect from APR 2019)			
EEB610	Power System II	EEC610	Distribution and Utilization
EEB620	Programmable Logic Controller	EEC542	Programmable Logic Controller(EI)
EEB631	Power Electronics & Drives	EEC631	Power Electronics & Drives
EEB632	Non-conventional Energy Sources	-	No Alternate Subject
EEB633	Computer Hardware & Networking	EEC633	Computer Hardware & Networking
EEB640	Programmable Logic Controller Practical	EEC572	Programmable Logic Controller Practical(EP I)
EEB650	Computer Aided Electrical Drawing Practical	EEC550	Computer Aided Electrical Drawing Practical
EEB661	Power Electronics & Drives Practical	EEC661	Power Electronics & Drives Practical
EEB662	Non-conventional Energy Sources practical	-	No Alternate Subject
EEB663	Computer Hardware & Networking Practical	EEC663	Computer Hardware & Networking Practical
EEB670	Project Work and Viva Voce	EEC670	Project Work and Viva Voce

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC310

Subject Title : ELECTRICAL CIRCUIT THEORY

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Name of Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Autonomous Exam	Total
EEC310	Electrical Circuit Theory	6	90	25	75	100

Topics and Allocation

Unit	TOPIC	TIME (hrs)
I	Electrostatics and D.C. Circuits	17
II	Network Theorems	17
III	Single phase A.C Circuits	17
IV	Resonant Circuits and Three Phase Circuits	17
V	DC. Transients and Storage Batteries	17
	Revision and Test	5
	Total	90

RATIONALE

Electric circuit analysis is the process of finding the voltages across, and the currents through, every component in the network. There are many different techniques for calculating these values.

This subject is the course on the basics of Network Analysis, introduction to network elements and explained all the possible method for finding voltage and current in any network component with DC, single phase AC and 3 phase AC sources.

It aims at making the student conversant with different techniques of solving the problems in the field of Electric circuits and analysis.

OBJECTIVES

The students should be able to:

1) Explain the concept of electrostatics and capacitance effect and analyze different Circuit Elements, Energy Sources and analysis of Network by Kirchhoffôs Laws.

2) Analyze the concept of Node and Mesh Analysis; analyze different theorems for dc circuits.

3) Analyze single phase circuits using resistor, inductor & capacitor elements.

4) Explain and analyze series and parallel resonant behaviour of a circuit.

5) Analysis of balanced three phase ac circuit and three phase power measurement

6) Understand the concept of transients and the behaviour of circuits during transient conditions.

EC310 – ELECTRICAL CIRCUIT THEORY

DETAILED SYLLABUS

Unit I Electrostatics and D.C. Circuits

a) Electrostatics

Electric Flux - Electric Flux Density ï Electric field intensity ï Electric potential ï Coulombós laws of electrostatics ï concept of capacitance ï relationship between Voltage, Charge and Capacitance ï energy stored in a capacitor ï capacitance of parallel plate capacitor ï capacitors in series and in parallel ï types of capacitors and their applications ï Problems in above topics.

b) D.C. Circuits

Basic concepts of current, emf, potential difference, resistivity, temperature coefficient of resistance ï Ohmôs law ï applications of Ohmôs law ï work, power energyï relationship between electrical, mechanical and thermal units ï resistance ï series circuits ï parallel and series parallel circuits ï Kirchoffôs laws ï Problems in the above topics.

Unit II Network Theorems

Network ï Branches ï Nodes ï Mesh current and Node voltage analysisï Voltage source and Current source transformations - Star and Delta transformations ï Super position Theorem, Theveninôs Theorem - Nortonôs Theorem - Reciprocity Theorem- Maximum power transfer theorem. (Problems in D.C Circuits only)

Unit III Single phase A.C Circuits

ójôOperator ï rectangular and polar coordinates ï Sinusoidal voltage and current ï instantaneous, peak, average and effective values ï form factor and peak factor (derivations for sine wave) ï pure resistive, inductive and capacitive circuits ï RL, RC, RLC series circuits ï impedance ï phase angle ï phasor diagram ï power and power factor ï power triangle ï apparent power, active and reactive power ï parallel circuits (two branches only) ï conductance, susceptance and admittance ï problems on all the above topics- concepts of harmonics.

Unit IV Resonant Circuits and Three Phase A.C. Circuits

a) Resonant Circuits

Series Resonance ï Parallel Resonance(R, L & C parallel, RL & C parallel only) ï Quality factor- Dynamic Resistance ï Comparison of series and parallel resonance- Problems in the above topics- Applications of Resonance Circuits.

b) Three Phase A.C. Circuits

Three phase systems- phase sequence- necessity of three phase system- concept of balanced and unbalanced load- balanced star and delta connected loads ï relation between line and phase voltages and currents ï phasor diagram ï three phase power and power factor measurement by single wattmeter and two wattmeter methods- problems on above topic.

Unit V DC Transients and Storage Batteries

a) DC Transients

DC Transients ï RL circuit ï RC circuit ï RLC circuit ï Simple problems

b) Storage Batteries

Classification of cells ï Construction, Chemical action and physical changes during charging and discharging of lead acid, nickel iron and nickel cadmium cells ï Advantages and disadvantages of nickel ion and nickel cadmium cells over lead acid cell - indication of fully charged and discharged battery ï defects and their remediesï capacity - AH efficiency and WH efficiency (no problems) ï methods of charging - care and maintenance ï applications ï maintenance free batteries ï lithium cells and mercury cells ï Concept of recharged cell.

Text Books :

Sl.No.	Name of the Book	Author	Publisher
1.	Electrical Circuit Analysis	Dr. M. Arumugam Dr. N. Premkumaran	Khanna Publishers New Delhi

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Circuits and Networks Analysis and Synthesis	A.Sudhakar Shyammohan S. Palli	Tata McGraw- Hill
2.	Electric Circuits	Joseph A Edminister	Schaum Series

ELECTRICAL CIRCUIT THEORY

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) State Coulombôs law of electrostatic.

(2) State and explain ohmôs law.

(3) Derive an expression for the equivalent resistance of three resistors connected in parallel.

(b) (1) Two capacitors having capacitance 4 MFD and 8 MFD are connected in series across a 240v supply. Findð

(i) The p.d across each.

(ii) The Charge.

(iii) The energy stored in each capacitor.

(2) A resistor of 10 ohms is connected in series with two resistors of 15 ohms each arranged in parallel. What resistance must be shunted across the parallel combination so that to total current taken shall be 1.5 amp with 20 volt applied.

II. (a) (1) State and explain theveninôs theorem.

(2) State and explain maximum power transfer theorem with an example.

(3) Calculate the delta equivalent of three star resistors 10,15 and 20 ohms.

(b) (1) A wheat stone bridge has four resistances branches AB=4ohms, BC=3 ohms, CD= 6 ohms, DA=5ohms. A 4v cell is connected across A and C. Get the Theveninôs

network across B and D. Also find the current in 10 ohm meter shunted to terminal B and D.

(2) Two generators with EMFs of 150 volt and 155 volt and armature resitance of 3 ohms and 2.5 ohms respectively feed a common load of 12 ohm resistance. Find the current supplied by each generator using superposition theorem.

III. (a) (1) Explain the termsð

(i) Cycle.
(ii) Frequency.
(iii)Period.

(2) Explain the term phase angle.

(3) Draw the phasor diagram of a series R-C circuit and derive the

Impedance.

(b) (1) Prove that power in a R-L series circuit is VIcosẅ

(2) A circuit consists of a 10 ohm resistor, a 30 MFD capacitor, an inductor having an inductance of 0.96 henry all in series across a 200V,50HZ Supply. Calculateð

(i) The current in the circuit.

(ii) The power factor of the circuit.

(iv) The power

IV. (a) (1) Explain the term Q-factor in resonant circuit.

(2) Briefly explain the significance of circuit 3 phase

(3) Prove that in a balance star connected load the neutral current is zero.

(b) (1) Explain two-wattmeter method of three-phase power measurement in a three-phase---

(i) Star (ii) Delta load.

(2) Three coils having a resistance of 20 ohms and an inductance of 0.2 H each are connected in delta to a 415V, 50HZ, 3phase supply. Calculate the line current, power factor and power consumed.

V. (a) (1) Write about the active materials used in Nickel iron cell.

(2) Write about the indications of fully charged cell.

(3) Give the applications of lead acid cell.

(b) (1) Write about the chemical action and physical changes during the charging and discharging of batteries.

(2) Explain the maintenance procedure for all types of cells.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC320

Subject Title : DC MACHINES AND TRANSFORMERS

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Name of Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC320	DC Machines and Transformers	5	75	25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Electromagnetism	14
II	D.C. Generators	14
III	D.C. Motors	14
IV	Single Phase Transformers	14
V	Three Phase Transformers	14
	Revision and Test	5
	TOTAL	75

RATIONALE

This subject is classified under core technology group which intends to teach the facts, concepts, principles of electrical machines, such as DC generators, DC motors, single & three phase transformers.

Student will be able to analyze the characteristics of DC generators and motors, Transformers, battery & Qualitative parameters of these static and dynamic machines. These machines are used in transmission, distribution and utilization systems.

Knowledge gained by students will be helpful in study of technological subjects such as utilization of electrical energy, switchgear & protection, manufacturing processes & maintenance of electrical machines.

OBJECTIVES

Students will be able to:

1. Understand Magnetic Materials and their properties, Electromagnetic Induction principle and associated laws.
2. Know the constructional details & working principles of DC machines and transformers.
3. Evaluate the performance of dc generators, motors & transformers.
4. Decide the suitability of dc generator, motor & transformer for particular purpose.
5. Write the specifications of dc machines & transformers as per requirement. Know the maintenance aspects of DC machines and Transformers.

EEC320 - DC MACHINES AND TRANSFORMERS

DETAILED SYLLABUS

Unit I Electromagnetism

Definitions- Magnet, Magnetic flux, MMF, Reluctance, Permeability, Flux Density- Types of Magnetic Materials - Magnetization curve ï Hysteresis and Eddy current losses.

Electromagnetic Induction - Faraday's laws of Electromagnetic induction-ï Lenz's law - Flemingôs right hand and left hand rule ï Maxwellôs cork-screw rule.

Types of induced EMF- Static (Self & Mutual) and Dynamic- Transformer ï principle of operation ï construction ï EMF equation ï Voltage ratio ï Simple problems.

Magnetic force and torque - Energy stored in Magnetic field -Lifting power of Electromagnet (Simple problems in all topics)

Unit II DC Generators

Principle of operation -Constructional details - Types of D C Generators - EMF equation (simple problems) -Lap and wave winding (No winding diagram).

Different types of excitation ï Conditions for self excitation - Critical resistance - No load characteristics of shunt & compound generators - Load characteristics of series, shunt & compound generators - Losses and Efficiency ï Problems in above topics - Applications of D.C. Generators.

Armature reaction ï Commutation - Causes of sparking in commutator ï Methods of improving commutation.

Unit III D C Motors

a. DC Motors

Principle of operation - Torque, Back EMF & Speed equations (simple problems)- Classification -Characteristics of shunt , series & compound motors -Applications.

Speed control - Field control and Armature control -Necessity of starter - 3 point starter, 4 point starter - Losses and efficiency -Testing (Load test & Swinburne's test) - Simple problems.

b. Maintenance of DC Machines

Defects in commutator and remedies ï Mica undercutting - Resurfacing of commutator -

Brushes - Functions and requirements - Brush holder - function and different types - Staggering of brushes - Brush Pressure - Defect in DC armature winding - Growler.

Unit IV Single Phase Transformers

Phasor diagram of transformers on no load & load (lagging p.f., leading p.f., & unity power factor) - Voltage regulation (simple problems) - Transformer Losses & Efficiency.

Equivalent circuit - OC & SC tests - Determination of Efficiency and regulation from OC and SC tests ï Sumpnerôs test - Condition for max efficiency - All day efficiency (simple problems) ï Polarity test ï Parallel operation of single phase transformer.

Principle of Auto transformer - Saving of Copper - Applications.

Unit V Three Phase Transformers

Construction and principle of operation ï Types of connections ï Star-Star, Star-Delta, Delta-Star, Delta-Delta, Scott Connection, V connection.

Parallel operations ï Conditions for parallel operation - Load sharing.

Cooling of Transformer- Various Cooling Arrangements - Protective devices and accessories (Conservator, Breather, Buch-Holz relay & Explosion vent). Transformer Oil tester ï Acidity test.

Tap changing transformers ï Necessity of tap changing ï ON load and OFF load tap changing. Varies transformer ï Welding transformer ï Booster transformer.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	A Course in Electrical Engineering (Volume -2)	B.L. Theraja	S. Chand & Co., New Delhi

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Electrical Technology	Edward Hughes	English Language Book Society, Longman, England
2.	Operation & Maintenance Electrical Equipment	B.V.S. Rao	Media Promoters & Publishers Pvt. Ltd., Bombay
3.	Electrical Technology	J.B. Gupta	S.K. Kataria and Sons, New Delhi

DC MACHINES AND TRANSFORMERS

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Define:

i. Flux density,

ii. Reluctance.

(2) State Flemingôs left hand rule.

(3) State Maxwellôs cork screw rule.

(b) (1) Derive an equation for Energy stored in a magnetic field.

(2) Drive the expression for dynamically induced EMF.

II. (a) (1) What are the applications of DC Generator.

(2) Explain the term critical resistance.

(3) List the conditions of self excitation

(b) (1) Explain the constructional details of a DC Generator.

(2) Drive the EMF Equation of DC generator.

III. (a) (1) Explain the necessity of starter for a DC motor.

(2) Draw and explain the speed ï Torque characteristics of a DC shunt Motor.

(3) List the applications of Shunt & Series motors.

(b) (1) Derive the Torque equation of Dc motor.

(2) With a neat diagram explain the working of a 3 point starter.

IV. (a) (1) State the condition for maximum regulation of a Transformer.

(2) Explain the losses in a transformer.

(3) A single phase transformer has 200 turns on the Py. And 100 turn on Sy. The load draws a current of 20 A from the Sy. If the Py . Winding is connected to a 200V supply, Determine (1) Primary Current, (2) Secondary voltage.

(b) (1) Derive the EMF equation of a Transformer.

(2) A 30 KVA, 2400/120V , 50Hz, Transformer has High voltage winding resistance of .1Ý and leakage reactance of 0.22 Ý. The low voltage winding resistance is 0.035 Ý and leakage reactance is 0.012 Ý . Find the equivalent winding resistance, reactance and impedance referred to the voltage side and low voltage side.

V. (a) (1) State the importance of Buch-Holz Relay.

(2) Classify the protective devices of a transformer.

(3) Briefly explain about the Scott connection.

(b) (1) Explain the Parallel operation of two transformers.

(2) State the necessity of tap changing in transformers and explain auto Transformers tap changing.

DC MACHINES AND TRANSFORMERS

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Define :-

(i) MMF.

(ii) Flux.

(2) Define: Lenz law.

(3) The field winding of a DC Electromagnet is wound with 960 turns and has a resistance of 50 ohms. When the existing voltage is 230 V, the flux linking with the coil is 0.005 webers. Find the self-inductance of the coil.

(b) (1) Explain ñMagnetic Hysteresis and state its significance.

(2) Derive an expression for energy stored in a magnetic field.

II. (a) (1) List the difference types of DC Generator.

(2) A shunt Generator delivers 450 Amperes at 230 Volts. The resistance of shunt field and armature are 50 ohms and 0.003 ohms respectively. Calculate the generated EMF.

(3) Explain ñResistance Commutationò in DC Generator.

(b) (1) A Shunt generator delivers 195 Ampere at a terminal voltage of 250 V. The armature and shunt field resistances are 0.02 ohms and 50 ohms respectively. The iron and friction losses are 950 watts.

Find:

(i) EMF generated.

(ii) Copper Losses.

(iii) Output of prime moves.

(iv) Commercial efficiency.

(2) Explain ñArmature reactionò and state its effects.

III. (a) (1) State the principle of operation of DC motors.

(2) Explain the speed-torque characteristics of DC series motor.

(3) State the need for starter in a DC motor.

(b) (1) Explain with neat sketch, the method of finding of efficiency of a DC machine indirectly.

(2) Explain with neat diagram, the field and armature control of DC shunt motor.

IV. (a) (1) Derive the EMF equation of a transformer.

(2) Explain ñAll day efficiency of a transformerò.

(3) List the applications of auto transformer.

(b) (1) Explain ñAuto transformerò and state, how saving in copper can be achieved.

(2) Explain the procedure for finding efficiency and regulation of a transformer by conducting OC and SC test.

V. (a) (1) List the applications of conservator.

(2) What is the use of tertiary winding?

(3). Explain load sharing of transformer.

(b) (1) State the importance of protective devices for transformers and explain.

(2) Explain the followings-

i) Autotransformer

ii)Welding Transformer

iii) Varies Transformer

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC330

Subject Title : ELECTRONIC DEVICES AND CIRCUITS

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Name of Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC330	Electronic Devices And Circuits	5	75	25	75	100

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Semiconductors and Diodes	14
II	Bipolar Junction Transistor	14
III	Transistor oscillators and FET and UJT	14
IV	SCR, DIAC, TRIAC, MOSFET and IGBT	14
V	Opto Electronics Devices and Wave shaping Circuits	14
	Revision and Test	5
	TOTAL	75

RATIONALE:

Every diploma holder in Electrical and Electronics Engineering should have sound knowledge about the components used in Electronics Equipments used in day today life and in industries. This is vital in R&D Department for improving the design of any electronic system, designing of electronic circuit and so on. To meet the industrial needs, diploma holders must be taught about the fundamentals of Electronic devices and Circuits. By studying this subject, they will be skilled in handling all types of electronic devices and able to apply the skill in electronics system.

OBJECTIVES

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

- Identify the components of an Electronic Circuit using standard symbol and terminology.
- Explain the working principle of **electronic devices** such as PN junction diode, zener diode, BJT, FET, UJT, SCR, DIAC, TRIAC, MOSFET, IGBT and Opto Electronic Devices.
- Use the above devices in suitable electronic circuits.
- Explain the construction and operation of **electronic circuits** such as Rectifiers, Regulators, Amplifiers, Oscillators, Multivibrators and wave shaping circuits.

EEC330 – ELECTRONIC DEVICES AND CIRCUITS

DETAILED SYLLABUS

Unit I Semiconductors and Diodes

Definition, Classification ï Intrinsic - Extrinsic ï PN Junction diode ï Forward and Reverse bias characteristics ï Specifications.

Rectifier ï Classification of Rectifiers ï Half Wave Rectifier ï Full Wave Rectifier(Center tapped, Bridge) ï Efficiency ï Ripple factor ï Applications

Zener diode ï Construction & working principle ï Characteristics ï Zener break down ï Avalanche break down ï Zener diode as a voltage regulator ï Applications ï Specifications.

Filters ï C, LC and PI Filters.

Unit II Bipolar Junction Transistor

Bipolar Junction Transistor ï Types (NPN, PNP) - Working principle ï Transistor Biasing ï Fixed bias, Collector base bias, Self bias - CB, CE, CC Configurations ï Characteristics ï Comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain

Transistor as an amplifier ï Load characteristic analysis ï RC coupled amplifier ï Emitter follower and its applications ï Basic Concepts, effect of Negative feedback, Types of Negative feedback connections ï Transistor as a switch.

Unit III Transistor oscillators and FET and UJT

a) Transistor Oscillator ï Classifications ï Condition for Oscillation (Barkhausen critierion) ï General form of LC Oscillator ï Hartley Oscillator ï Colpitts Oscillator ï RC Phase shift Oscillator, Crystal oscillator.

b) Field Effect Transistorï Constructionï Working principle of FET ï difference between FET and BJT ï Characteristics of FET ï Specifications ï FET amplifier (Common source Amplifier).

c) UJT – Construction ï Equivalent circuit ï Operation – characteristics ï UJT as a relaxation oscillator.

Unit IV SCR, DIAC, TRIAC, MOSFET and IGBT

a) SCR ï Introduction ï Working ï Two transistor analogy of SCR ï VI characteristics ï SCR as a Switch, Controlled rectifier ï Specifications ï Applications.

b) DIAC ï Construction ï Working ï Characteristics ï Diac as bi-directional switch-Applications.

c) TRIAC ï Basic working principle ï Characteristics ï Applications. Speed control of fan using Diac and Triac.

d) MOSFET ï Construction ï Characteristics ï MOSFET as a Switch ï Applications - CMOS basic concept

e) IGBT ï Basic principle ï IGBT as a Switch ï Applications

Unit V Opto Electronics Devices and Wave shaping Circuits

LDR, LED, 7 segment LED, LCD, Opto coupler, Opto interrupter ï Infrared transmitter and Receiver ï Laser diode (simple treatment) ï Solar cell ï Avalanche Photodiode ï Photo transistor.

Diode clipper ï Types ï clamper circuits using diode ï Voltage doubler, Astable Multivibrator, Monostable and Bistable Multivibrator using Transistor ï Schmitt Trigger.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Principle of Electronics	V.K. Mehta	S. Chand & Co., New Delhi

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Electronics principles	Malvino	Tata McGraw Publication
2.	Electronics Devices and Circuits	Allen Mottershed	Tata McGraw ï Hill Publication
3.	Electronics Devices and Circuits	Jacob Millman and Halkies	Tata McGraw ï Hill Publication
4.	Optical Fiber Communication	Gerd Keiser.	Tata McGraw ï Hill Publication

ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) State the types of capacitor.
(2) State the specifications of Inductor.
(3) Draw the Forward Bias characteristics of Diode.

(b) (1) Draw the Forward and reverse bias characteristics of zener diode and Explain.
(2) Describe the operation of Bridge rectifier with its output waveform.

II. (a) (1) Draw the frequency response curve for RC coupled amplifier.
(2) Explain transistor as an amplifier.
(3) Draw the characteristics of CB configurations.

(b) (1) Write the principle of operation and characteristics of Common Emitter configuration.
(2) Write the principle of operation of Emitter follower and its Applications.

III. (a) (1) Write the conditions for oscillations.
(2) Compare FET and UJT.
(3) Explain LC oscillator
(b) (1) Explain the working principle of phase shift oscillator.
(2) Explain the operation of N channel FET.

IV. (a) (1) Explain Two transistor analogy of SCR.
(2) Describe DIAC as bidirectional switch.

(3) Write about CMOS basic concept.

(b) (1) Explain the operation of MOSFET with neat sketches.

(2) Explain the working principle of TRIAC with its VI characteristics.

V. (a) (1) Draw the diode clipper and clamper circuits.

(2) What is LED? Draw its characteristics.

(3) Write the examples of wave shaping circuits

(b) (1) Explain the working principle of bi-stable operation of a transistor.

(2) With the neat sketches explain the operations of

i) Solar cell

ii) Photo transistor.

ELECTRONIC DEVICES AND CIRCUITS

MODEL QUESTION PAPER – II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Mention various type of Capacitors And their specific applications.

(2) Explain the working of a Zener Diode with its Characteristics, Mention its Uses.

(3) Explain Avalanche breakdown.

(b) (1) Describe the operation of Full wave Rectifier with output waveform and Mention its uses.

(2) Explain various colour coding used in resistors with suitable examples.

II. (a) (1) Compare the features of transistor configurations.

(2) What is negative feedback?

(3) Explain input impedance, output impedance, current gain, voltage gain

(b) (1) Explain the operation of RC coupled amplifier with its frequency response characteristics.

(2) Explain transistor as an amplifier and different load lives.

III. (a) (1) Write the classification of oscillators.

(2) Draw the equivalent circuit of UJT.

(3) Write the features of RC oscillator.

(b) (1) Explain the working principle of UJT and explain its VI Characteristics.

(2) Explain the working of crystal oscillator and compare its features with other oscillators.

IV. (a) (1) Compare SCR and TRIAC.

(2) Draw the characteristics of DIAC.

(3) Explain IGBT as a switch.

(d) (1) Explain the working principles of SCR with its characteristics.

(2) Explain the operation of Speed control circuit using DIAC and TRIAC.

V. (a) (1) Differentiate Clipper and Clamper.

(2) What is LDR? draw its characteristics.

(3) Compare astable and monostable multivibrator.

(b) (1) Explain the working of voltage doubler.

(2) Write short notes on ï

i) Laser Diode

ii) Opto Coupler

iii) LCD

iv) IR transmitter and receiver.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC340

Subject Title : ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC340	Electrical Circuits And Machines Practical	6	90	25	75	100

RATIONALE

- To provide hands on experience in handling electrical machines to the diploma students, practical subjects are introduced corresponding to every theory subject.
- This practical supports the aim and objective of DC Machines and Transformer and Electrical Circuit Theory Subjects.

OBJECTIVES

- Make the various circuit connections
- Practically prove all the theorems dealing with dc current flow
- Understand the characteristics of electrical machine and to determine the efficiency of the machines.
- Test the transformer to find its efficiency, voltage regulation and characteristics.

EEC340 - ELECTRICAL CIRCUITS AND MACHINES PRACTICAL

LIST OF EXPERIMENTS

ELECTRIC CIRCUIT THEORY

1. Verification of super position theorem with two different DC voltages for a common load
2. a) Verification of Thevenin's theorem with a DC supply
   b) Verification of Norton's theorem with a DC supply
3. a) Verification of reciprocity theorem
   b) Verification of maximum power transfer theorem
4. Measure the power in RLC series circuit. Calculate the power factor and draw the phasor diagram.
5. Construct RLC Circuit for Series Resonance and draw the Frequency versus Impedance curve.

DC MACHINES AND TRANSFORMERS

6. No load and load characteristics of self excited DC shunt generator
7. Load characteristics of self excited DC series generator
8. Load test on a DC shunt motor
9. Load test on a DC series motor
10. Load test on a DC compound motor
11. Predetermine the efficiency of a DC machine by Swinburne's test
12. Speed Control of DC Shunt motor by
    a) Armature control method.
    b) Field control method.
13. Load test on a single phase transformer
14. Load test on a three phase transformer
15. Equivalent circuit of a single phase transformer by conducting open circuit and short circuit test and predetermine the efficiency and regulation.
16. Parallel operation of two similar single phase transformers.

Note for examiners:

Questions for End Semester Practical Examination should be set as follows.

For every two experiments on MACHINES one experiment on CIRCUITS should be selected for each session of practical examination.

S.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 Compound Motor 3/5 KW (or more) with loading arrangement	1
4.	DC Shunt Generator 3/5 KW (or more) coupled with prime mover	1
5.	DC Series Generator 3/5 KW (or more) coupled with prime mover	1
6.	1 phase Transformer 1KVA (or more) 220V/110V	3
7.	3 phase Transformer 1KVA (or more) 440V/220V	1
8.	1 phase Variac 15 amps	3
9.	3 phase Variac 15 amps	1
10.	Dual Regulated Power Supply 0-30V/2A	2
11.	Single Regulated Power Supply 0-30V / 2A	2

Equipments to be in the electrical machines laboratory

1) Electrical circuits and machines practical
2) Electrical machines and instrumentation practical.

S.NO	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1.	Single phase Resistive Load 3/5 KW, 220V	2
2.	Three Phase Resistive Load 3KW,415V	1
3.	Tachometer Analog type	2
4.	Tachometer Digital	1
5.	Rheostat – **various ranges 50Ω/5A,100 Ω/5A, 300 Ω/2A, 600 Ω/2A (or** equivalent)	15
6.	AC Ammeter – various ranges 0-500mA, 0-1/2A, 0-5/10A,0-10/20A (or equivalent)	12
7.	DC Ammeter – various ranges 0-500mA, 0-2A,0-5A,0-10A,0-15/30A (or equivalent)	15
8.	DC Voltmeter – 0-5/10V, 0-30V, 0-300V	10
9.	AC Voltmeter – 0-75V, 0-150V, 0-300V, 0-600V	10
10.	Wattmeter – various ranges LPF 150/300/600V 2.5A/5A,1/2.5A	6
11.	Wattmeter – various ranges UPF 75/150/300,5/10A	6
12.	Wattmeter – various ranges UPF 150/300/600V 10/20A	8

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Circuit Diagram	20
2.	Connection and Execution	25
3.	Reading, Calculation, Graph, Result	25
4.	Viva-voce	05
	Total Marks	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC350

Subject Title : ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC350	Electronic Devices And Circuits Practicals	6	90	25	75	100

RATIONALE

- To make them realize the theoretical concepts studied in theory subjects, practical subjects are introduced corresponding to every theory subject.
- This practical supports the aim and objective of Electronic Devices and Circuits theory subject.

OBJECTIVES

- Make the various circuit connections
- Practically realize and understand the characteristics of Electronic Devices.
- Construct various Electronic Circuits and to visualize their output.

EEC350 – ELECTRONIC DEVICES AND CIRCUITS PRACTICALS

LIST OF EXPERIMENTS

1. Construct and plot the VI characteristics of PN junction diode and find the cut-in voltage.
2. Construct and plot the VI characteristics of Zener diode and find the break down voltage.
3. Construct and plot the regulation characteristics (by varying either load or line voltage) of Half wave rectifier with and without filters.
4. Construct and plot the regulation characteristics (by varying either load or line voltage) of Full wave rectifier with and without filters.
5. Construct and plot the regulation characteristics (by varying either load or line voltage) of Bridge rectifier with IC Voltage regulator.
6. Construct and draw the Input and output characteristics of CE Transistor configuration and find its input & output resistance.
7. Construct and draw the frequency response of RC coupled amplifier and determine the 3-db bandwidth.
8. Construct and verify RC phase shift Oscillator.
9. Construct and plot the drain characteristics of JFET and find its pinch off voltage.
10. Construct and plot UJT characteristics and find its Ip and Vv.
11. Construct and draw SCR characteristics and find its break over voltage.
12. Construct and plot the DIAC and TRIAC characteristics.
13. Construct and draw the waveforms of positive clipper and clamper.
14. Construct and draw the characteristics of LDR and a photo transistor.
15. Simulate the half wave, full wave and bridge rectifier using the simulation tool like PSPICE/ multisim/orcad/tina
16. Simulate the astable and mono stable multi vibrator using the simulation tool like PSPICE/ multisim/orcad/tina

Note: Atleast 5 experiments should be constructed using breadboard/soldering.

EQUIPMENTS REQUIRED:

S.NO	Name of the Equipments	Range	Required
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	20 MHz / 30MHz	5
5.	Digital Multi meter	-	10
6.	DC Voltmeter (Analog/Digital)	Different Ranges	15
7.	DC Ammeter (Analog/Digital)	Different Ranges	15
8.	(i) Computers for simulation Experiments (ii) Software - **PSPICE/ multisim / orcad / tina(Any 1)**		2

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Circuit Diagram	20
2.	Connection (20) & Execution (20)	40
3.	Result	10
4.	Viva-voce	05
	Total Marks	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC360

Subject Title : ELECTRICAL WIRING AND WINDING PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC360	Electrical Wiring And Winding Practical	3	45	25	75	100

RATIONALE

Providing hands on experience in Electrical Wiring and Winding to diploma students of Electrical and Electronics Engineering is vital. This subject is included to expertise the students in the above mentioned area.

OBJECTIVES

At the end of this practical subject the students should be able to

- Execute House Wiring.
- Execute Industrial Wiring.
- Execute service mains connection.
- Wind No-volt coil/ transformer winding.
- Give end connections of 3phase Induction motor.

DETAILED SYLLABUS

EEC360 - ELECTRICAL WIRING AND WINDING PRACTICAL

WIRING

1. Control three lamps with individual switch and provide MCB for master control.
2. To prepare a wiring circuit to check the availability of R/Y/B phases using one lamp only by operating individual switches for each phase and test it.
3. Stair case wiring for G+3 floors.
4. Emergency alarm wiring with 3 bells and 3 push buttons.
5. Wiring of single phase motor using single phase main switch, D.O.L starter and MCB.
6. Wiring of Three phase induction motor with main switch, Star/delta starter and ELCB.
7. House wiring for a service connection with single phase digital Energy meter cutout, main switch, 4way D.B, Indicator lamp.
8. Wiring of sodium vapour and mercury vapour Lamp.
9. Wiring and troubleshooting the Fluorescent Tube light.
10. Make a switch board to control two lamps and one fan with plug point, provide four switches, one regulator and one 3 pin 5A plug point.
11. Design and implement a test board with indicator lamp, fuse unit to test electrical appliances.
12. Tunnel wiring using 4 lamps.

WINDING

1. Design, construct and test a 230/12-0-12 volt, 500mA Transformer.
2. Design No volt coil for a 230/440 AC contactor.
3. Dismantling a faulty ceiling fan and identify the fault, run the fan after rectifying the fault.
4. Demonstrate the end connection for a 3 phase induction motor winding for a 2 poles / 4pole operations.

Note for Examiners

Questions for End Semester Practical Examination should be set as follows. For two exercises on wiring one exercise on winding should be selected for each session of practical examination.

LIST OF EQUIPMENTS

S.NO.	DESCRIPTION	SPECIFICATION	QTY
1.	SPST Flush type switch	250V/5A	15
2.	Batten Lamp holder	-	10
3.	Round block		20
4.	Switch board	20cm*15 cm	4
5.		10cm*10cm	15
6.	M.C.B.	250V/10A ,2 pole	2
7.	Push button switch	250V/5A	5
8.	2 plate ceiling rose	250V/5A	10
9.	Electric bell	250V/5A	3
10.	Single phase D.P.I.C. Main switch	250V/16A	3
11.	Single phase D.O.L. Starter	250V/10A	1
12.	Three phase T.P.I.C. Main switch	500V/30A	2
13.	Star / delta starter	440V/5HP	1
14.	E.L.C.B.	30mA/100mA	1
15.	Single phase, Digital Energy meter	250V/15A,50HZ	1
16.	Cut out	16A	1
17.	Single phase, 4 way distribution Box	250V/15A	2
18.	Mercury vapour lamp with accessories		1 Set
19.	Sodium vapour lamp with accessories		1 Set
20.	Fluorescent tube light with electronic choke and holder	40W	2 Set
21.	Two way flush type switch	250V/5A	10
22.	Wooden box	30 cm*15cm	4
23.	PVC pipe	¾"/1"	Req.Qty
24.	Saddle clips	¾"/1 "	Req.Qty
25.	Copper wire	2.5 Sq.Mm, 1.5 Sq.Mm	Req.Qty
26.	**1" junction box**	1 way,2way,3way	Req.Qty
27.	Screws		Req.Qty
28.	Bare copper wire	2.5 Sq.Mm	Req.Qty
29.	Lamps (C.F.L. or Incandescent)	Different ratings	Req.Qty
30.	EI60 type stampings of 0.35 mm thickness		55
31.	Readymade bobbins (EI60/21)		Req.Qty

32.	Enamelled Copper Wire	25,36,37,38 SWG	Req.Qty
33.	Varnish		Req.Qty
34.	Winding machine		1
35.	Ceiling fan		2
36.	Single phase induction motor	0.5 HP/50HZ,240V	1
37.	Three phase squirrel cage induction motor	3HP, 500 V, 50 Hz	1
38.	Gauge plate for measurement of SWG	-	1
39.	**Winding study motor (3Φ squirrel cage** type)		1

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Wiring diagram /Design	20
2.	Execution	40
3.	Result	10
4.	Viva-voce	05
	Total Marks	**75**

EEC370 - COMPUTER APPLICATIONS PRACTICAL

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : III

Subject code : EEC370

Subject Title : COMPUTER APPLICATIONS PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC370	Computer Applications Practical	3	45	25	75	100

RATIONALE:

Providing hands on experience in using computer for documenting, creating and maintaining database, etc., to diploma students of Electrical and Electronics Engineering is vital. This subject is included to expertise the students in the above mentioned area.

OBJECTIVES:

On completion of this practical subject, the students must be able to

- Understand the Windows operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Analyze the data sheet

- Create and manipulate the database
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the eighteen experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The end semester practical examination question paper contains two questions-the first question from section-I and the second question from section-II. Each question carries 35 marks and viva voce carries 5 marks.
- The computer systems should be 1:2 ratio for practical classes

ALLOCATION OF MARKS

Board Examinations ï 75 Marks

Content	MARKS ALLOTTED	
	Section I	Section II
Writing steps	15	15
Execution of exercise	15	15
Result with Printout	5	5
Viva voce	5	
Total	75 MARKS	

LIST OF EXERCISES

SECTION – I

WINDOWS

Introduction- History of Windows- screen saver and monitor resolution ï Wallpaper setting- Folder manipulation ï properties of a folder ï Recycle bin ï Short cuts ï Sorting Folder ï Switching between Application ï Copying in CD/DVD settings ï Recording Audio files.

Exercises

1. a. Installing screen saver and change the monitor resolution by 1280X960

   b. Setting wall papers

   c. Creating, moving, deleting and renaming a folder

   d. Copy, paste and cut a folder/file

   e. Displaying the properties for a file or folder

2. a. Restoring files and folders from Recycle bin

   b. Creating short cuts for folder/file

   c. Finding a file or folder by name

   d. Selecting and moving two or more files/folders using mouse

   e. Sorting folders/files.

3. a. Copying files into CD/DVD

   b. Switching between applications

   c. Making the taskbar wider and hiding the taskbar

   d. Recording and saving an audio file

   e. Set/Change the date and time.

WORD PROCESSING

Introduction ï Menus ï Tool bar ï Create ï Edit ï Save ï Alignment ï Font Size ï Formatting ï Tables ï Fill Colors ï Mail Merge ï Page Setup - Preview ï Water marking ï Header ï Footer ï Clip art.

Exercises

4. Create the following table and perform the operations given below

ABC PVT. LTD. Chennai

Production Summary of various Units in every Quarter

Unit	Product - ID	Jan-Mar	Apr-june	July-Sept.	Oct-Dec.
Unit - I	56	234.	50	74	125
Unit - II	142	236	126	175	251
Unit - III	213	541	216	60	43
Unit - IV	125	243	127	250	136
Unit - V	143	152	138	80	45

- Arrange Unit name as left align and other columns as right align.
- Use doubled Border to the Summary Title and fill with 15% gray colour.
- Implement merging and splitting two or more cells
- Give alternative four colour for columns.
- Print the above table.

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

6. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add ócconfidentialô as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction ï Menus ï Tool bar ï Create ï Edit ï Save ï Formatting cells ï Chart wizard ï Fill Colors ï Creating and using formulas ï Sorting ï Filtering.

Exercises

7. Create a result sheet containing Candidate's Register No., Name, and Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

Result is Distinction if Total >= 70 %

First Class if Total > = 60 % and < 70 %

Second Class if Total >= 50 % and < 60 %

Pass if Total >= 35 % and < 50 %

Fail otherwise

Create a separate table based on class by using auto filter feature.

8. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue colour and lowest donation with red colour. The table should have a heading.

9. Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.

SECTION – II

DATABASE

Introduction ï Menus ï Tool bar ï Create ï Edit ï Save ï Data types ï Insert ï Delete ï Update ï View ï Sorting and filtering ï Queries ï Report ï Page setup ï Print.

Exercises

10. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.

- Name should be not null

11. Prepare a payroll for employee database of an organization with the following details:

Employee Id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other eductions if any.

Perform simple queries for different categories.

12. Design a pay slip for a particular employee from the above database.

PRESENTATION

Introduction ï Menus ï Tool bar ï Create ï Edit ï Save ï Slide transition ï Insert image ï Hyper link ï Slide numbers ï View slide show with sound ï Photo album ï Clip art.

Exercises

13. Make a marketing presentation of any consumer product with at least 10 slides. Use

Different customized animation effects on pictures and clip art on any four of the ten slides.

14. Create a Presentation on ñCommunication Skillsò with three different slide transitions with sound effect.

15. Create a photo album in PowerPoint.

INTERNET

Introduction ï Browsers ï Open a website ï Email: Send, receive and delete ï Email with Attachments Google docs ï Search Engines ï Searching topics

Exercises

16. Create an e-mail id and perform the following

- Write an e-mail inviting your friends to your Birthday Party.
- Make your own signature and add it to the e-mail message.
- Add a word attachment of the venue route
- Send the e-mail to at least 5 of your friends.

17. Create a presentation on Google docs. Ask your friend to review it and comment on it. Use ñDiscussionò option for your discussions on the presentation.

18.Find out the direction and distance about road travel from Delhi to Agra using the Internet search. Also make a report of the Map and other details like place to stay and visit at Agra

MODEL QUESTION PAPER

<table>
<tr><td colspan="2">Year / Sem: II / III Subject: COMPUTER APPLICATIONS PRACTICAL

Code: EEC370</td></tr>
<tr><td colspan="2">Answer all the questions

Max.Marks:75</td></tr>
<tr><td>1</td><td>Section - I

Prepare line, bar and pie chart to illustrate the subject wise performance of the class for any one semester.</td></tr>
<tr><td></td><td>Section - II

Create an e-mail id and perform the following

• Write an e-mail inviting your friends to your Birthday Party.
• Make your own signature and add it to the e-mail message.
• Add a word attachment of the venue route
• Send the e-mail to at least 5 of your friends.</td></tr>
</table>

LIST OF EQUIPMENTS AND THE QUANTITY REQUIRED

FOR A BATCH OF 30 STUDENTS

SOFTWARE REQUIREMENTS	
Operating System	Windows XP or Windows Vista or Windows 7 / Linux
Office Package	Microsoft office 2000 or Office 2003 or Office 2007/Open Office
HARDWARE REQUIREMENTS	
Desktop Computer System with latest configuration	30 Nos
Power Backup (UPS)	10 KVA
Laser Printer	3 Nos

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Computer Applications Practical Manual	Dr.V.Karthikeyan Mr.D.Arulselvan	Learning Resource Centre, Thiagarajar Polytechnic College, Salem- 636 005
2.	Windows 7 in easy steps	Harshad kotecha	Tata McGrawHill
3.	A First Course in Computer 2003	Sanjay Sasena	Vikas Publications

4.	MS Office ï 2003	Ramesh Bangia	Kanna Book Publication
5.	Introduction to Computers with MS-Office 2000	Alexis Leon & Mathews Leon	Tata McGraw-Hill
6.	Mastering Microsoft Office 2000	Gini Courter & Annette Marquis	BPB Publications

IV SEMESTER

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : EEC410

Subject Title : AC MACHINES

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC410	AC Machines	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Alternator Principle and Construction	14
II	Performance and Testing of An Alternator	14
III	Three Phase Induction Motor	14
IV	Single Phase Induction Motor and Synchronous Motor	14
V	Special Electrical Machines	14
	Revision and Test	5
	TOTAL	75

RATIONALE:

This subject is classified under core technology group intended to teach students facts, concepts, Principles of electrical machines such as induction motor, alternator and synchronous motor. The knowledge gained by the student is useful in the study of technological subjects such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical machines.

OBJECTIVES

To understand

- Alternator Principle, Construction, Types, EMF Induced and cooling
- Performance of an Alternator, Testing, Characteristics, parallel operation, Load sharing etc.,
- 3-ū Induction Motor, Principle, Construction, Types, Characteristics and Applications, starting Methods
- 1-ū Motor types, Construction, Characteristics and Applications
- Synchronous Motor, Starting, Construction, Characteristics Applications
- Special Electric Machines

DETAILED SYLLABUS

EEC410 - AC MACHINES

Unit I Alternator – Principle and Construction

Basic Principle - Construction - Salient Pole Type and Cylindrical Type, Advantages Rotating Type (Stationary Armature) - Damper Winding - Turbo Alternator - Types of Armature Winding -Terms Used In Armature Winding - Single Layer, Double Layer, Full Pitched, Fractional Pitched Winding, Slot Angle, Pitch Factor and Distribution Factor (Derivation) - Simple Problems. Effect of Pitch Factor on Harmonics ï Advantages of Short Chorded Winding ï Methods of obtaining Sine Wave in Salient Pole and Non-Salient Pole Alternators ï EMF Equation ï Problems ï Cooling of Alternator ï Different Methods ï Advantages of Cooling by Using Hydrogen and its Merits.

Unit II Performance and Testing Of An Alternator

Load Characteristics of Alternator - Causes for Voltage Drop in Alternators ï Armature Resistanceï Armature Leakage Reactance ï Armature Reaction ï Synchronous Reactance ï Vector Diagram of a Loaded Alternator ï voltage Regulation- OC and SC Test - Direct Load Test - Determination of Voltage regulation by Synchronous Impedance Method, Ampere Turn Method and

Zero Power Factor Method -Problems on Synchronous Impedance Method and Ampere Turn Method - Necessity of Parallel Operation (Synchronizing) of Alternators - Dark Lamp Method - Bright Lamp Method -Synchronscope Method - Synchronizing Current -Synchronizing Power- Synchronizing Torque - Effects of Changing Excitation of Alternators- Load Sharing of Two Alternators - Alternators Connected to Infinite Bus Bar.

Unit III Three Phase Induction Motor

Introduction - Construction - Comparison of Cage and Slip ring Induction Motor - Production of Rotating Magnetic Field in 3ű -Principle of operation - Slip - Frequency of Rotor Current - Torque - Starting Torque Derivation - Condition for Max Starting Torque ï Rotor EMF and Reactance Under Running Condition - Torque Under Running Condition (Derivation) Problems - Slip Torque Characteristics -Relationship between Starting Torque and Full Load Torque Development of Phasor Diagram - No Load & Blocked Rotor Test - Development of Approximate Equivalent Circuit - Circle Diagram - Speed Control ï EMF Method, Pole Changing Method, Rotor Resistance Method and Cascading Method - Starters - DOL, Rotor Resistance Starter, Star Delta Starter, Auto Transformer Starter - Crawling and Cogging in Induction Motors -Applications.

Unit IV

Single Phase Induction Motor

Double Field Revolving Theory for Single Phase Induction Motor - Construction, Principle of Working and Application of Split Phase Motor, Capacitor Type Motors (Capacitor - Start and Capacitor Start and Run Motor), Shaded Pole Motor, Repulsion Motor and Universal Motor - Applications.

Synchronous Motor:

Construction and Principle of Synchronous Motor ï Why Synchronous .Motor is not Self Starting - Methods of Starting - Effects of Excitation on Armature Current and Power Factor - Comparison Between Synchronous and Induction Motors - V Curve and Inverted Curve -Applications of Synchronous Motors ï Simple problems on Power Factor Improvement.

Unit V Special Electric Machines

Permanent magnet Synchronous motors ï Construction and performance ï advantages ï applications ï synchros ï constructional features ï control transmitter ï control receiver ï applications of synchros ï AC servo motors- two phase AC servo motor ï linear induction motor.

Permanent magnet DC motor ï construction ï working principle ï speed control ï advantages ï applications ï servo motors ï DC servo motors ï Stepper motors ï variable reluctance stepper motor ï permanent magnet stepper motor. BLDC Motor ï Principle of operation ï Applications.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	A text book of Electrical Technology (Volume -2)	B.L. Theraja	S. Chand & Co., New Delhi

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Electrical Machines	Nagarath	TMH publications
2.	Electrical Machines	Bhattacharya	TMH publications
3.	Electrical Technology	Edward Hughes	Addision ï Wesley, International Student Edition
4.	Performance & Design of AC Machines	MG Say	CBS Publication, New Delhi

AC MACHINES

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions From (a) and any one division from (b) of each question. (2) All the questions carry equal marks. (3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) List the different methods of Cooling Alternator and mention the advantages of any one method.

(2) What is meant by (i) Pitch factor and (ii) Breadth factor of an a .c. winding.

(3) Explain any one method of obtaining sine wave in an alternator.

(b) (1) Explain the constructional details of stator and rotor of a salient pole alternator.

(2) Calculate the speed and open circuit phase voltage of a 4 pole 50 Hz, star connected alternator with 36 slots, 30 conductor per slot and full pitch. The flux/pole is 0.05 wb, sinusoidally distributed.

II. (a) (1) What is meant by (i) Synchronous reactance and (ii) Synchronous impedance of an alternator.

(2) Draw neat circuit diagrams for open circuit and short circuit tests of a three-phase alternator.

(3) List out the advantages of parallel operation of alternators.

(b) (1) Explain the EMF method of predetermining the voltage regulation of an alternator.

(2) State the conditions to be satisfied for paralleling an alternator with the bus bars. With schematic diagram explain the synchronizing of two

three- phase alternators by dark lamp method.

III. (a) (1) Three-phase, 4 pole, 50 Hz, induction motor runs at a speed of 1460 r.p.m. Determine the synchronous speed, percentage slip and the frequency of rotor EMF.

(2) Draw the slip torque characteristics of a three-phase induction motor for different values of rotor resistance.

(3) Define the term cogging and state how it can be prevented.

(b) (1) Draw the approximate equivalent circuit of induction motor and explain the determination of equivalent circuit constants of the induction motor.

(2) With neat diagram explain the operation of rotor resistance starter.

IV. (a) (1) Explain why a synchronous motor is not self starting.

(2) Compare a synchronous motor and a three-phase induction motor.

(3) Explain the operation of Repulsion Motor.

(b) (1) Explain the phenomenon ñHuntingò in synchronous motors and state how it is prevented. Mention the applications of synchronous motors.

(2) Explain the construction and working of split phase single phase induction motor. Mention its applications.

V. (a) (1) List any four applications of permanent magnet synchronous motor.

(2) Write short note on Linear Induction Motor.

(3) Write short note on DC Servo motor.

(b) (1) With neat sketch explain the construction and operation of synchros.

(2) With relevant sketches, explain the construction and operation of different types of stepper motor.

AC MACHINES

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions from (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) List the advantages of Cylindrical rotor over salient pole rotor.

(2) Obtain the relationship between the number of poles, speed and frequency.

(3) Write notes on transients in alternators.

(b) (1) Explain with neat sketches the constructional details of salient pole alternator.

(2) The stator of a star connected 3 phase, 6 pole alternator driven at 1000 rpm has 54 slots. The winding has 10 turns per coil. The flux per pole is 0.16 webers sinusoidally distributed. Assuming full pitch coils find the value of line EMF.

II. (a) (1) Write a brief note on synchronizing power and torque.

(2) Draw the connection diagram of short circuit test and characteristic of star connected alternator.

(3) Define: Effective resistance and Synchronous impedance.

(b) (1) Explain in detail the synchronous impedance method of finding the Regulation of an alternator.

(2) Describe with neat sketches, the phenomenon of armature reaction and its effects on the performance of the alternator.

III. (a) (1) Explain the principle of operation of linear induction motor.

(2) Derive the condition for maximum torque.

(3) Draw the slip torque characteristics of a three-phase induction motor for different values of rotor resistance.

(b) (1) Draw and explain a pushbutton operated direct on line starter for a three- phase induction motor.

(2) Explain how the speed control is achieved by injected emf method.

IV. (a) (1) Compare synchronous motor and induction motor.

(2) Explain about synchronous condenser.

(3) List applications of Single Phase Induction Motor.

(b) (1) Describe the construction, principle of working and applications of split phase motor.

(2) Explain the construction and principle of Shaded pole motor.

V. (a) (1) List the applications of synchros.

(2) Write short note on AC servomotor.

(3) List the advantages of PMDC motor.

(b) (1) With neat sketch explain the construction and operation of PM synchronous motor.

(2) With neat sketch, explain the construction and operation of DC servomotor.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : EEC420

Subject Title : MEASUREMENT AND INSTRUMENTATION

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC420	Measurement And Instrumentation	**4**	**60**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Classification and characteristics of instruments	**11**
II	Measurement of voltage, current and resistance.	**11**
III	Measurement of power and energy	**11**
IV	Special instruments and bridges	**11**
V	Transducers and instrumentation	**11**
	Revision and Test	**5**
	TOTAL	**60**

RATIONALE:

Measurement of any system parameter is used to describe the system performance. Automation of any kind begins with the measurement of certain system parameters. In fact, industrial growth moves hand in hand with the growth of the measuring system. Therefore it is highly essential for Electrical students to study about the measurement of various electrical parameters in a system and the construction and working of different instruments used in measurement of such parameters.

OBJECTIVES:

Students will be able to

- To define fundamental terms used in measuring instruments.
- To understand various operating forces and effects used in instruments.
- To understand construction and principle of operation of meters used to measure voltage, current and resistance.
- To understand the principle behind measuring power, energy and power factor.
- To understand the concept of measuring phase difference and frequency.
- To measure the inductance and the capacitance using bridges.
- To explain the operation of CRO and its applications.
- To understand the construction and principle of operation of various transducers
- To understand the concept of measuring strain, pressure, flow, angular velocity, temperature, pH value, radiation using corresponding transducers.

DETAILED SYLLABUS

EEC420 - MEASUREMENT AND INSTRUMENTATION

Unit I Classification and characteristics of instruments

General ï definition of measurement ï functions of measurement system (Indicating, recording and controlling functions) - Applications of measurement systems.

Classification ï absolute and secondary instruments ï indicating, recording and integrating instruments - Analog and Digital instruments.

Definitions - true value, accuracy, precision, percentage static error and correction, instrument efficiency.

Principle of operation - effects used in instruments- Operating forces ï deflecting, controlling and damping forces ï construction details- moving system - types of supports- balancing - torque weight ratio control systems (spring control and gravity control) ï damping systems ï Magnets ï pointers and scales

Unit II Measurement of voltage, current and resistance

Types of instruments ï Construction, working and derivation of torque equation of moving coil, moving iron, dynamometer type and induction type(shaded pole construction) instruments - Extension of instrument ranges ï shunt and multiplier (calculation and requirements, Simple Problems)- Tong Tester - current transformer and potential transformer (No derivations, working principle only). Measurement of resistance ï ohm meter (series and shunt type), Megger and Earth tester.

Cathode Ray Oscilloscope ï CRT- constructional parts - Electron Gun - Deflection Plate - Fluorescent Screen - Glass envelope ï Base ï Time Base Generators - block diagram of a general purpose CRO, Basic CRO circuits and controls ï vertical deflection system - horizontal deflection system types of sweeps - synchronization ï Blanking ï Intensity Modulation ï positioning control ï focus control ï intensity control ï calibration circuit ï astigmatism ï Measurement of Phase and frequency ï Applications of CRO. Introduction to Digital Storage Oscilloscope ï Dual trace CRO.

Unit III Measurement of power and energy

Types of wattmeter - Construction and operation of dynamometer type wattmeter - LPF wattmeter ï 3 phase two element wattmeter.

Construction and working of induction type single phase energy meter ï friction compensation - creep and prevention ï Errors and adjustments in energy meters- 3 phase energy meter (connection circuit only) ï RSS meter Calibration of Energy meter - Introduction to Multi function Energy meter ï Applications - Measurement of power and energy using CT and PT (Circuit only)

Power factor meter - Single phase and three phase (dynamometer type) ï construction and working.

Unit IV Special instruments and bridges

Phase sequence indicator ï Phase difference measurement using Synchroscope (Weston type) - Trivector meter ï Merz price maximum demand indicator.

Frequency meter ï mechanical resonance (vibrating reed type) and Weston type frequency meters ï digital frequency meter (simplified composite block diagram)

Measurement of DC current using Shunt resistance and current sensors.

Multimeters: Analog Multimeter ï Digital Multimeter

Bridges - Wheatstone Bridge ï Basic form of AC bridge ï Anderson and Schering bridge for measurement of Inductance and capacitance (No derivation ï Formula only)

Unit V Transducers and Instrumentation

(Qualitative treatment only)

Transducers ï Definition -Electrical transducers ï Classification of electrical transducersï Active and Passive ï Primary and Secondary - Construction and principle of working of Strain gauge ï LVDT ï RVDT ï Piezo electric transducers ï Proximity sensors ï Inductive and Capacitive types ï Digital encoding transducers .

Measurement of strain using wheatstone bridge ï measurement of pressure using inductive transducer ï measurement of angular velocity using Tachogenerator ï Thermo couples ï Thermistors ï Measurement of temperature using Metal Resistance Thermometer ï See beck effect ï basic circuit ï Simple application ïï Radiation pyrometer ï measurement of flow using electromagnetic flow meter ï measurement of thickness using ultrasonic vibrations ï measurement of pH value using a pH cell ï Measurement of radiation using Geiger Muller tube.

Text Book :

Sl.No.	Name of the Book	Author	Publisher
1.	A course in electrical and electronic measurements and instrumentation	1. A.K.Sawhney 2. PuneetSawhney	DhanpatRai& Co., (P) Ltd., New Delhi.

Reference Books :

Sl.No.	Name of the Book	Author	Publisher
1.	Electronic Instrumentation	HS Kalsi	Tata McGraw Hill Publishing Co., New Delhi
2.	Modern Electronic Instrumentation and Measurement techniques	Albert D.Helfrick William David Cooper	Prentice-Hall of India (P) Ltd., New Delhi
3.	Electronics and Instrumentation	1. Dr.S.K.Battachariya 2. Dr.RenuVig	S.K.Kataria& Sons, New Delhi 6.

MEASUREMENTS AND INSTRUMENTATION

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) How are instruments primarily classified? Give example for each.
(2) Compare spring control and gravity control in instruments
(3) Write short notes on ñpointerò

(b) (1) Define the following term as applied to measuring instruments :-
(1) true value (2) accuracy
(3) precision (4) Correction
(5) Instrument efficiency
(2) Explain with neat sketch, the various types of damping forces in measuring instrument.

II. (a) (1) List the advantages and disadvantages of MI instruments .
(2) Why the secondary of CT should not be open circuited while in operation.
(3) Explain briefly electrostatic focusing in CRO.

(b) (1) Explain the construction working principle of attraction type moving iron meter with neat sketch.
(2) Draw the block diagram of a CRO and explain the various sections.

III (a) (1) List out the various errors in wattmeter when measuring A.C power.
(2) What is phantom loading in testing of energy meter.
(3) Draw the connection diagram showing the use of CT and PT while measuring 3-phase energy

(b) (1) Explain with neat sketch, the construction and working principle of single phase induction type energy meter .
(2) Explain with neat sketch, the construction and working principle of single phase dynamo meter type power factor meter .

IV. (a) (1) Explain the working of a rotating type phase sequence indicator.
(2) Draw Anderson bridge for measurement of inductance.
(3) Compare murray loop test with varley loop test.

(b) (1) Explain the operation of MERZ price maximum demand indicator with neat sketch.

(2) With a neat block diagram explain the working of digital multi meter.

V. (a) (1) List out the advantages of electrical transducers over mechanical transducers.

(2) Explain the working principle of a thermo-couple.

(3) Explain the operation of DC tacho generator for the measurement of speed.

(b) (1) With neat sketch, explain the operation of LVDT.

(2) Explain with neat sketch the principle of working of an electromagnetic flow meter.

MEASUREMENTS AND INSTRUMENTATION

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Define the terms Accuracy and Instrument efficiency.
(2) What are the effects used in instruments? Explain any one of the effect .
(3) Explain the significance of Torque weight ratio.

(b) (1) Explain the various methods of damping with neat sketch.
(2) Write short notes on the following used in instruments with suitable figure.
a)Magnets b)Pointer c)Scales

II. (a) (1) What are the main types of instruments used as Ammeter and Voltmeter?
(2) Acertain moving coil instruments of resistance 0.1 ohm gives full scale deflection With a coil current of 500 milli amps. How the instrument can be used to measure
a)current upto 20A, b)Voltage upto 200V.
(3) Why the secondary of CT should not be open circuited while in operation?

(b) (1) Explain the principle of a PMMC instrument with neat sketch. Derive the torque Equation.
(2) Draw the block diagram of a general purpose CRO and explain the various section.

III. (a) (1) What are the errors in Wattmeter readings when measuring a.c. power? Draw the Circuit of LPF Wattmeter.
(2) What are the errors in Energymeter? How they are adjusted ?
(3) Draw a neat sketch to show how three phase energy meter is connected in circuit.

(b) (1) Describe with a neat diagram how single phase energy meter is tested with Phantom loading and RSS meter.
(2) Expain with a neat sketch the working of a single phase dynamometer type power factor meter.

IV. (a) (1) Draw a neat diagram of Merz-Price maximum demand indicator. What are its advantages and disadvantages?

(2) What is the principle of digital frequency meter ? Draw its block diagram.

(3) Draw the circuit diagrams of Anderson and Schering bridges .Write the formula obtained.

(b) (1) Explain with a neat sketch the construction and working of a Weston type Synchroscope.

(2) Describe Murray loop test to locate ground and short circuit faults in U.G. cables.

V. (a) (1) Explain the principle of working of LVDT.

(2) What are thermistors ? Draw their different types of construction.

(3) Explain measurement of strain using Wheat stone bridge.

(b) (1) Explain the principle and working of inductive proximity sensor showing coil and plate arrangements.

(2) Explain measurement of radiation using Geiger Muller tube.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : EEC430

Subject Title : ELECTRICAL ESTIMATION & ENERGY AUDITING

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC430	Electrical Estimation & Energy Auditing	**4**	**60**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Systems of Internal Wiring and Earthling	**11**
II	Domestic, Commercial and Industrial Installation Estimate	**11**
III	Energy Auditing and Energy management in Electrical System	**11**
IV	Energy Conservation in Motors and Transformers.	**11**
V	Energy conservation in Lighting System, Pumping System and Diesel Generating System	**11**
	Revision, Test	**5**
	Total	**60**

RATIONALE:

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 cost), it is necessary to conserve energy. Hence it is necessary to study energy auditing methods and energy saving opportunities in electrical system.

OBJECTIVES:

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

- Draw conventional symbols for various electrical installations.
- To quote the relevant IE rules for a given electrical installation, earthing and clearance of service lines.
- Familiarize the types of wiring.
- List the points to be considered for selection wiring.
- Determine the size of wire for internal wiring.
- Explain the necessity and types of earthing.
- Estimate the quantity of materials required for earthing.
- Differentiate between neutral and earth wire.
- Estimate the quantity of materials required for domestic and industrial wiring.
- Explain the concept and types of energy audit.
- Explain the energy saving opportunities in Transformer, Induction motor, lighting and DG system.
- Explain the roll of power factor controller in energy saving system.
- Explain the roll of sensors in energy saving system.
- Explain the energy efficient technologies in electrical system.

DETAILED SYLLABUS

EEC430 - ELECTRICAL ESTIMATION & ENERGY AUDITING

Unit I Systems of Internal Wiring and Earthling

Conventional symbols for various wiring items, accessories etc. A brief study of Indian Electricity Rules (1956) on installation and earthing.

Systems of Internal wiring

Wiring systems - Types of wiring - points to be considered for selection of wiring - comparison - Looping back system and Joint box system and tree system - Position of switches, cutouts, main switch board, sub-distribution boards. Considerations for selecting wire size - size of conductors/cable used for Domestic installation, Service connection, Distributors- Power rating of some important household electrical appliances ï selection of Fuses.

Earthing and Testing of Installation

Necessity - different methods - pipe earthing and plate earthing - materials required - requirements of good earth electrode neutral wire - difference between neutral wire and earth wire - connection with earth - value of earth resistance and factors on which it is dependent - points to be remembered while providing earth - ELCB system -Earthing of domestic fitting and appliances - Industrial Earthing -Substation Earthing. Insulation Resistance test between earth and conductor and between conductor - Leakage test - Insulation Resistance of motors and other equipment - Factors to be considered for checking electrical installations - Testing of wiring installation: introduction, verification of polarity, effectiveness of earthing, insulation resistance, earth resistance- periodical testing - testing of UG cable - Guidelines for installation of fitting switches, light, fans, earthing of appliances and electrical machines.

Safety Signs showing type of PPE to be worn, Prohibition Signs, Warning Signs, Mandatory Signs, Advisory of safe conditions.

Unit II Domestic, Commercial and Industrial Installation Estimate

Conditions and Requirements for Domestic, Commercial and Industrial Installation - steps to be followed in preparing electrical estimate (domestic, industrial and agricultural installation)

Estimate the quantity of material required for

(1) Residential single bed room Flat (1BHK).

(2) Industrial power wiring having 3 or 4 machines.

(3) Erection of one no. 15hp induction motor in Saw mill / Flour mill.

(4) Factory lighting scheme.

(5) Computer centre having 10 computers, a/c unit, UPS, light and fan.

(6) Street Light service having 12 lamp light fitting

Unit III Energy Auditing and Energy management in Electrical System

(i) Energy Auditing

Energy Audit- Definition, Need, Types of Energy Auditing - Energy management approach- understanding energy costs- bench marking ï energy performance ï matching energy use to requirement ï maximizing system efficiencies ï optimizing input energy requirement ï Fuel and energy substitution ï Energy audit insruments - Energy Audit Report ï Energy Conservation Building Code.

(ii) Energy management in Electrical System

Electricity billing ï Electrical load management ï Maximum demand control ï Energy saving potential of Maximum demand controller - Power factor improvement and its benefits ï ï selection and location of capacitor ï performance assessment of power factor capacitors ï Energy saving potential of automatic power factor controller.

Unit IV Energy Conservation in Motors, Transformers

Motors

Operation of Induction Motor - Special Design feature for high efficiency motor - Torque - Speed Characteristics ï Operating parameters of motor - Losses - Measurement of efficiency - Determination of energy saving - determination of Load ï Assessment of economic feasibility - choice of energy efficient motor - Effect of variation of voltage on the performance of motor - effect of load variations on efficiency and power factor - unbalanced phase voltage- insulation system ï Energy saving potential of energy efficient motors ï Energy saving potential of soft starters with energy saver.

Transformers

Introduction - Transformer Losses - Fixed Losses ï Load Losses. Evaluation of Transformer Losses - Case Studies ï reduction in Transformer Losses. Energy Conservation Building Code -

mandatory requirements - maximum allowable power transformer losses. Energy Efficient Transformer and its energy saving potential.

Unit – V: Energy conservation in Lighting System, Pumping System and Diesel Generating System

Lighting System

Light source ï choice of lighting ï luminance requirement ï Energy saving potential of electronic ballasts ï Energy saving potential of Occupancy sensors - Fluorescent tube lights - CFL lamps ï Energy efficient lighting control - Energy conservation avenues in Lighting system.

Pumping Systems

Pumping System characteristics ï Factors affecting pump performance - Efficient pumping system operation - Variable Frequency Drives - Energy Conservation Opportunities in Pumping Systems.

Diesel Generating System

Factors affecting selection of diesel generating system ï Energy performance assessment of Diesel conservation avenues.

Text Book :

Sl.No.	Name of the Book	Author	Publisher
1.	Energy Engineering and Management	Amlan Chakrabarti	PHI Learning Pvt Ltd

Reference books:

Sl.no	Name of the Book	Author	Publisher
1.	Electrical Wiring, Estimating and Costing	Dr.S.L.Uppal.	Khanna Publishers.
2.	Electrical Design Estimating and Costing	K.B.Raina & S.K.Battacharya	New age international (p) limited. Publishers
3.	Energy Auditing in Electrical Utilities	Rajiv Shankar	Viva Books

ELECTRICAL ESTIMATION & ENERGY AUDITING

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) What are the various types of wiring and explain it briefly?
(2) List the factors to be considered while determining the size of conductors and explain plate earthing?
(3) State the difference between neutral and earth wires and explain the points to be remembered?

(b) (1) Explain in detail Looping Back, Joint Box and Tree systems with diagrams.
(2) Explain the requirements of a good earthing system.

II. (a) (1) Estimate the quantity of materials required for residential single bed room?
(2) Estimate the quantity of material required for irrigation pump motor?
(3) Estimate the industrails power wiring having 4 or 5 machines?

(b) (1) A residential building is to be electrified with surface PVC conduit concealed type of wiring Give the schedule of material. The details of fittings are as follows:

Name of the Room	**Size**	**No. of Tube lights**	**No. of Fans**	**No. of ordinary lamps**	**No .of Plugs**
Drawing Room	5m*6m	2	1	1	1
Kitchen	2m*4m	1	1	-	1
Bed Room	4m*4m	1	1	1	1
Bath Room	1m*1m	-	-	1	1
Toilet	1m*1m	-	-	1	-

Assume necessary data as per IE rules and mentioned them clearly.

(2) Workshop of size 25m*10m . A 15HP, 400V,50 Hz induction motor has to be installed for running a saw mill. Estimate the quantity of materials required with their specification. Assume surface metal conduit wiring and necessary data as per the IE rules.

III. (a) (1) What is energy audit?

(2) Describe the points covered in an energy audit report?

(3) What is maximum demand control?

(b) (1) Explain the Energy Management approach.

(2) Discuss in detail about the selection and location of power factor capacitors.

IV. (a) (1) List the effects of variation of voltage on the performance of motor.

(2) What is energy efficient motor?

(3) How to reduce transformer losses?

(b) (1) Discuss the energy saving potential of Energy efficient transformer.

(2) Discuss the energy saving potential of soft starter with energy saver.

V. (a) (1) What is electronic ballast?

(2)What is occupancy sensor?

(3) List the factors affecting selection of diesel generating system?

(b) (1) Explain Energy conservation opportunities in lighting system.

(2) Explain Energy conservation opportunities in pumping systems.

ELECTRICAL ESTIMATION & ENERGY AUDITING

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) Describe the method of measuring insulation resistance of an installation and explain types of Fuses?

(2) What is services connection ?Explain how underground service connection are given to the Consumers?

(3) What are the requirements for domestic and industrial wiring?

b) (1) Explain the various factors to be considered in selecting the wire size of conductors/cables used for domestic installations.

(2) State the importance of Insulation Resistance. Explain Insulation Resistance test between earth and conductor and between conductors.

II. a) (1) Write a note on guidelines for installation of switches,lights&fans?

(2) Explain the steps involved in preparing electrical estimate for industrial consumers?

(3) List the exclusive aspects of industrial electrical installation?

b) (1) A Residential single bed room flat is to be electrified with PVC conduit concealed type of wiring .Estimate the quantity of materials required with specifications. The details of the fittings are as follows:

Name of the Room	**Size**	**No. of Tube Lights**	**No .of Fans**	**No. of ordinary lamps**	**No .of Plugs**
Drawing Room	5.0m*6.0m	2	1	1	2
Kitchen	4.0m*4.0m	1	1	1	1
Bed Room	4.0m*2.0m	1	-	1	1
Bath Room	1.5m*1.5m	-	-	1	-
Toilet	1.5m*1.5m	-	-	1	-

(2) Prepare an Estimate for factory lighting scheme. Mention the assumptions made.

III. (a) (1) What is energy audit?

(2) Describe the points covered in an energy audit report?

(3) What is maximum demand controller?

(b) (1) Explain the Energy Management approach.

(2) Discuss in detail about automatic power factor controller.

IV. (a) (1) Classify the load for induction motor in industries with examples.

(2) What is energy efficient transformer?

(3) How to reduce transformer losses?

(b) (1)A 50 KW induction motor with 86% present full load efficiency is being considered for replacement by an 89% efficiency motor. What will be the savings in Energy if the motorworks for 6000 Hrs. per year and cost of energy is Rs.4.50/KWh?.

(2)Which of the following Transformers is preferable ?

Life of both the transformers is 15 years and the transformer remains on load for 8500 Hrs. In a year. Energy cost is Rs.5.25.

	Transformer-I	**Transformer-II**
Purchase Price	Rs. 3 Lacs	Rs.3.15 Lacs
No Load Losses	1650 W	1450 W
Load Losses	9500 W	7500 W
Efficiency at rated Capacity	70 %	70 %

V. (a) (1) List any two factor regarding choice of lighting?

(2)What is variable frequency drive?

(3) List the factors affecting selection of diesel generating system?

(b) (1) Explain Energy saving potential of (i) Electronic Ballast (ii) Occupancy sensor.

(2) Explain Energy conservation opportunities in pumping systems.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : EEC440

Subject Title : ANALOG AND DIGITAL ELECTRONICS

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC440	Analog And Digital Electronics	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs.)
I	Linear ICs: Op-amps, Timers and their applications	**14**
II	Boolean Algebra	**14**
III	Combinational Logic	**14**
IV	Sequential Logic	**14**
V	D/A, A/D and Memory	**14**
	Revision, Test	**5**
	Total	**75**

RATIONALE:

Analog and digital Electronics holds applications in all home appliances and industrial instrumentation in digital world. This subject will impart in depth knowledge of Number systems, Logics of Combinational & Sequential circuits and also about various, recent Memory devices. The subject will also impart the idea of linear integrated circuits.

OBJECTIVES:

- To understand the De-**Morgan's theorem.**
- To understand the concept of Karnaugh Map.
- To Learn about Basic logic Gates.
- To Study about Boolean techniques.
- To learn the different digital logic families
- To learn arithmetic circuits-adder/subtractor, BCD adder.
- To understand the encoder/decoder & MUX / DEMUX
- To understand the concept of parity Generator, and checkers
- To understand various types of flip-flops.
- To understand various types of counters.
- To understand various modes of shift registers
- To understand the concept of RAM & ROM and its types.
- To understand the Characteristics of op. amp.
- To list the applications of op.amp.
- To explain the Functional block diagram of 555 Timer.
- To construct Astable and Monostable Multivibrator using 555.

DETAILED SYLLABUS

EEC440 - ANALOG AND DIGITAL ELECTRONICS

Unit I Linear ICs: Op-amps, Timers and their applications

Operational amplifier ï Ideal Op.Amp ï Block diagram and characteristics ï (Minus input follows Plus input and No current through Minus and Plus input) ï Op-amp parameters ï CMRR ï Slew rate ï Virtual ground ï Applications of op-amp ï Inverting amplifier ï Summing amplifier ï Non inverting amplifier ï Voltage follower ï Comparator ï Zero crossing detector ï Integrator ï Differentiator ï Op.Amp Specifications.555 Timer ï Functional Block diagram ï Astable, Monostable and Schmitt Trigger ï Sequence timer. IC voltage regulator ï 3 pin IC regulators ï 78 xx, 79 xx, LM 317.

Unit II Boolean Algebra

Number systems ï Decimal ï Binary ï Octal ï Hexadecimal ï BCD ï Conversion from one number system to other ï Boolean Algebra ï Basic laws and Demorganôs Theorems ï Logic gates ï OR ï AND ï NOT ï NOR ï NAND ï EX-OR Symbols, Truth table and Boolean expression ï Realization of gates using universal gates NAND, and NOR ï Problems using 2, 3, and 4 variables ï Boolean expression for outputs ï Simplification of Boolean expression using karnaugh map (upto 4 variable)-Constructing logic circuits for the Boolean expressions.

Unit III Combinational Logic

Arithmetic circuits ï Binary addition ï Binary Subtraction ï 1ôs complement and 2ôs complement ï Signed binary numbers ï Half adder ï Full adder ï Half subtractor ï Full subtractor ï Parity Generator and checker ï Digital comparator ï Arithmetic Logic Unit ï Decoder ï 3 to 8 decoder ï BCD to seven segment decoder ï Encoder ï Multiplexer ï Demultiplexer ï Digital Logic families ï TTL ï CMOS ï LS series ï Fan in ï Fan out ï Propagation delay ï Noise immunity for the above families.

Unit IV Sequential Logic

Flip-flops ï RS ï D ï T ï JK ï Master Slave Flip Flops ï Edge triggered FF ï Asynchronous Binary Counter ï Decade counter ï Mod n counter ï Up Down Counter ï Presettable counter ï Ring counter ï Johnson counter ï Synchronous counter ï State diagram ï Shift register ï 4 bit shift register ï Serial in Serial out ï Serial in Parallel out ï Parallel in serial out.

Unit V D/A, A/D and Memory

D/A Converter ï Basic concepts ï Weighted Resistor D/A converter ï R-2R Ladder D/A converter ï Specification of DAC IC Sampling and quantization ï Analog to digital conversion using Ramp method ï Successive approximation method ï Dual slope method, simultaneous method voltage to frequency converter ï Frequency to voltage converter specification of A/D converter.Memory ï Static Memory ï Dynamic Memory ï Static Memory organization in terms of address lines, control lines and data lines ï Expanding memory (say 8k to 16k) ï SDRAM ï DDR RAM.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Linear Integrated Circuits	Choudhury.D.Roy & Shail Jain	New Age International
2.	Digital Logic and Computer Design	M.Morris Mano	Prentice Hall of India

Reference books:

Sl.No.	Name of the Book	Author	Publisher
1.	Digital Principles and applications	Albert Paul Malvino and Donold P. Leach	TMH ï 1991.
2.	Digital Electronics	Roger L. Tokheim Macmillan	McGraw ï Hill ï 1994.
3.	Digital Electronics An introduction to theory and practice	William H.Goth Mann	PHI 1998.
4.	Digital Fundamentals	Floyd	Universal Book Stall

ANALOG AND DIGITAL ELECTRONICS

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I) a) (1) Write the concept of Virtual Ground
(2) List out the characteristics of an ideal Op-Amp
(3) Give the Pin details of IC 555

b) (1) Draw and explain the functional diagram of the IC555 timer.
(2) Draw the circuit of Zero-crossing detector and explain.

II) a) (1) Explain briefly about Universal Gates.
(2) State and Write the equations for De Morgonôs Theorems.
(3) Explain Combinational Logic Circuit with example.

b) (1) Solve the given expression by using K map.
ú {0,2,4,,7,8,10,12,15}
(2) Construct a Logical circuit for the given expression
+ ⊕

III) a) (1) Write short notes on decoders and encoders
(2) Explain Half adder
(3) Discuss the effect of noise immunity in digital logic families.

b) (1) Explain the parity generator and checker with a neat diagram.
(2) Explain BCD to seven segment Decoder with a neat diagram.

IV) a) (1) Write down the classifications of counters.
(2) Enumerate the difference between Mod-n counter and Presettable counter
(3) What is tri-state buffer? Explain

b) (1) Draw the circuit and Explain any one type of shift registers.

(2) Draw a circuit and Explain the working Principle of Decade counter.

V) a) (1) Write short notes on flash memory.

(2) Describe the draw backs in Variable resistive type D/A Converters

(3) Write down the specifications for A/D and D/A Converters

b) (1) Explain with diagram any one type of D/A Converters

(2) Explain with diagram any one type of A/D Converters

ANALOG AND DIGITAL ELECTRONICS

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) State the characteristics of an ideal op. amp.
(2) What is virtual Ground of an op.amp? and explain Op amp as invertor.
(3) Explain ôZero crossing Detectorô with a neat diagram.

b) (1) i. Explain the working of a Comparator using op-amp.
ii. With a neat diagram and Waveforms, explain Zero Crossing detector using op. amp.

(2) i. Explain a monostable Multivibrator using 555 IC
ii. Explain the working of an integrator using op. amp.

II a) (1) Draw the Logic diagram for the Boolean f unction AB + C.
(2) Give the Truth Table of 2 input Ex-OR gate and NOR gate.
(3) State and Explain De-Morganôs theorem.

b) (1) Simplify the Boolean expression by using karnaughôs map

$$Y = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + A\bar{B}\bar{C}\bar{D} + \bar{A}B\bar{C}\bar{D}$$

(2) Construct i) OR ii) Ex-OR gates using NAND gates NOR gates and explain its operation.

III a) (1) State the Truth Table of a Half Adder and Full Adder.
(2) Define fan in and fan out of a logic gate.
(3) Draw and Explain ôParity Generatorô circuit.

b) (1) Draw the Logic diagram of a Full Adder and explain its working.
(2) Explain with a neat diagram 1 of 8 Multiplexer.

IV a) (1) What is the difference between Ring counter and Johnson counter?
(2) Give the logic diagram and Truth Table of JKMS FF.
(3) Draw and Explain ôParallel in- Serial out Shift Register.

b) (1) Explain the working of a 4 bit Binary up counter with a neat diagram and waveforms.

(2) Explain the working of JK MS Flip-Flop with a neat diagram.

V a) (1) Draw the circuit diagram of a Successive approximation A/D converter.

(2) Draw the circuit diagram of a 4 bit R-2R Ladder D/A converter.

(3) Explain the concepts of RAM and ROM.

b) (1) Explain the working of a 4 bit weighted Resistor D/A Converter with a neat diagram.

(2) Explain with a neat diagram, the Dual slope A/D converter

EEC450 - ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Course code : **1030**

Semester : **IV**

Subject code : **EEC450**

Subject Title : **ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL**

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC450	Electrical Machines and Instrumentation Practical	**6**	**90**	**25**	**75**	**100**

RATIONALE:

To impart practical knowledge to students, for every theory subject, corresponding practical subject is introduced. This practical subject helps to support the objective of AC machines and Measurements and instrumentation practical.

OBJECTIVES

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

Understand the characteristics of AC machines.

Make various electrical measurements.

Use transducers in non electrical quantity measurement

LIST OF EXPERIMENTS

ELECTRICAL MACHINES:

1. Predetermination of regulation of alternator by synchronous impedance method.
2. Load Test on three phase alternator.
3. Synchronising of two alternators by lamp & synchroscope method.
4. Determination of õVôCurve and inverted õVôcurves of a three phase synchronous motor.
5. Conduct load test on a single phase induction motor and plot
    a. Load Vs efficiency
    b. Load Vs Power factor
    c. Torque Vs Slip characteristic curves.
6. Conduct load test on three phase induction motor and plot
    a. Load Vs Efficiency
    b. Load Vs P.f.
    c. Torque Vs Slip characteristic curves.
7. Draw the (i) equivalent circuit and (ii) circle diagram of a 3 phase Induction motor by conducting No load and Blocked rotor test.
8. Improvement of pf of an induction motor with load

INSTRUMENTATION

1. Find the armature and shunt field resistance in a DC machine by wheat stone bridge method.
2. Find the value of unknown inductance by Anderson bridge method.
3. Find the value of unknown capacitance by using Schering bridge method.
4. Calibration of Wattmeter.
5. Calibration of 3 phase energy meter.
6. To measure the earth resistance by using Megger.
7. Displacement measurement using LVDT.
8. Calibration of Load Cell

NOTE FOR EXAMINERS :

Questions for Board Practical Examination should be set as follows.
For every one experiment on MACHINES one experiment on
INSTRUMENTATION should be selected for each session of practical examination.

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

QUESTION PATTERN

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	CIRCUIT DIAGRAM	20
2	CONNECTIONS AND PROCEEDING THE EXPERIMENT	25
3	READING/CALCULATION/GRAPH/RESULT	25
4	VIVA VOCE	05
	TOTAL	75

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : EEC460

Subject Title : ANALOG AND DIGITAL ELECTRONICS PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC460	Analog and Digital Electronics Practical	**6**	**90**	**25**	**75**	**100**

RATIONALE

- To make them realize the theoretical concepts studied in theory subjects, practical subjects are introduced corresponding to every theory subject.
- This practical supports the aim and objective of Analog and digital electronics theory subject.

OBJECTIVES

- Make the various circuit connections using ICs
- Practically realize and understand the characteristics of Op Amp.
- Construct various Digital Circuits and to visualize their output.

Note: At least five experiments should be constructed using bread board

LIST OF EXPERIMENTS

EEC460 - ANALOG AND DIGITAL ELECTRONICS PRACTICAL

1. Construct and test a) Inverting Amplifier and b)Non inverting amplifier using Op. Amp.
2. Construct and test a) Differentiator circuit b) Integrator circuit using Op. Amp.
3. Verify the truth table for the following gates AND, OR, NOT, NAND, NOR, EX-OR USING 74XX Ics.
4. Construct other gates using NAND gate and NOR gate.
5. Realization of logic circuit for a given Boolean expression.
6. Construct Half Adder and Half Subtractor using ICs and verify its truth table.
7. Construct Full Adder and Full Subtractor using ICs and verify its truth table.
8. Construction and verification of truth table for Decoder/Encoder.
9. Multiplexer/De-multiplexer using multiplexer ICôs.
10. Parity generator and checker using parity checker/ generator ICôs.
11. Construct and verify the truth table of RS,D, Tand JK flip-flops.
12. Construct a 4 bit ripple counter using flip flops.
13. Construct and verify the performance of a 1 digit counter using 7490, 7447, 7475 and seven segment LEDs.
14. Simulate the Clippers and clampers using the simulation tool like PSPICE/ multisim/orcad/tina.
15. Simulate the inverting and non inverting amplifier, voltage follower, integrator, differentiator, summing amplifier, difference amplifier(Any 3) using the simulation tool like PSPICE/ multisim/orcad/tina.
16. Simulate the Hartley and phase shift oscillator, sine, square and triangular waveform generators and precision rectifiers(Any 3) using the simulation tool like PSPICE/ multisim/orcad/tina.

EQUIPMENTS REQUIRED:

S.NO	Name of the Equipments	Range	Required
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	20 MHz / 30MHz	5
5.	Digital Multi meter	-	10
6.	DC Voltmeter (Analog/Digital)	Different Ranges	15
7.	DC Ammeter (Analog/Digital)	Different Ranges	15
8.	(i) Computers for simulation Experiments (ii) PSPICE/ multisim / orcad / tina (Any 1)		2

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Circuit Diagram	20
2.	Connection (20) & Execution (20)	40
3.	Result	10
4.	Viva-voce	05
	Total Marks	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : IV

Subject code : C0001

Subject Title : LIFE AND EMPLOYABILITY SKILLS PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject	Instructions		Examination			
Life and Employability Skills	Hours / Week	Hours / Semester	Marks			Duration
	4 Hrs.	60 Hrs.	Internal Assessment	Semester Examination	Total	
			25	75	100	3 Hrs

Topics and Allocation of Hours:

S.No.	SECTION `	No. of Hours
1	**Part A** Communication	30
2.	**Part B** Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health Hazard, Life Skills	20
3.	**Part C** Environment, Global Warming, Pollution, Communal Harmony	10
	TOTAL	60

RATIONALE

The present scenario unfolds a series of challenges that require a mastery of life skill. To confront with the challenges in the changing job environment and also to keep up with the rapid pace of modern life, life skills are to be honed and nurtured. Apart from the good understanding of the subject, the ability to communicate what one has in mind alone can take a student to greater heights. In an attempt to develop the communication skill, thereby, making them employable, the syllabus has been devised and titled as ñLife and Employability Skillsò. At the end of the course, the students become viable in the job market and with the aid of the life skill they have acquired they can maintain their poise and mental equilibrium even in a stressful work environment.

SPECIFIC INSTRUCTIONAL OBJECTIVES

TO

1. Emphasize and Enhance Speaking Skills

2. Increase Ability to Express Views & Opinions

3. Develop and Enhance Employability Skills

4. Induce Entrepreneurial skills

5. Accentuate Life Skills for Effective Managerial Ability

DETAILED SYLLABUS

LIFE AND EMPLOYABILITY SKILLS PRACTICAL

Unit	Topics	Activity	Hours
I	**Communication, Vocabulary Enrichment, Listening, Training, Facing Interviews, Behavioural Skills**	_ ñWordsmithyò (Words within a word ,a vocabulary game) -- Visual Description -- FAQs in interviews self- introduction/another higher official in company ï describe/explain product ï frame questions based on patterns ï make sentences based on patterns	**30**
II	**Entrepreneurship, Project Preparation**	-- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur ï prepare a résumé	**10**
III	**Productivity – comparison with developed countries, Effective Management, Occupational Accident &First Aid, Labour Welfare Acts & Rights**	-- search in the website -- prepare a presentation ï discuss & interact	**05**
IV	**Interview Techniques, Effective Persuasive Communication, Non verbal Communication, Intercultural Communication, Business Etiquettes**	-- search in the website -- prepare a presentation ï discuss & interact	**05**
V	**Environment, Global Warming, Pollution, Communal Harmony**	-- taking down notes / hints ï answering questions -- filling the blanks with the exact words heard	**10**

LEARNING STRUCTURE **100 Marks**

-- Focus more on Speaking & Listening Skills

-- Attention less on Reading & Writing Skills

-- Apply the skills in fulfilling the Objectives on Focused Topics

a) Listening	**25 Marks**	
1. Deductive Reasoning Skills (taking down notes/hints)	**10**	
2. Cognitive Skills (answering questions)	**10**	
3. Retention Skills (filling in the blanks with the exact words heard)	**05**	
b) Speaking Extempore/ Prepared	**30 Marks**	
1. Expressive Skills (describe/explain things)		**10**
2. Interview Skills&Behavioural skills(answering Questions in an interview)	**05**	
3. Assertive Skills (introducing oneself/others)	**05**	
4. Fluency/Compatibility Skills (dialogue)	**05**	
5. Leadership/Team Spirit Skills (group discussion)	**05**	
c) Writing & Reading	**20 Marks**	
1. Vocabulary Enrichment	**05**	
2.a. Creative & Reasoning Skills (frame questions on patterns)	**03**	
b. Creative & Composing Skills (make sentences on patterns)	**02**	
3. Attitude & Aim Skills (prepare a résumé)	**05**	
4. Entrepreneurship Skills (prepare an outline of a project)	**05**	
d) Continuous Assessment (Internal Marks)	**25 Marks**	
(search,read, write down, speak, listen, interact & discuss)		
1. Cognitive Skills (Google search on focused topics)		
2. Presentation Skills& Interactive Skills (after listening, discuss)		
Note down and present in the Record Note on any 5 topics (Focussed Topics)	**10 Marks**	
Other activities recorded in the Record note(All the exercises in the syllabus under Listening, Speaking, Writing & Reading)	**10 Marks**	
Attendance	**05 Marks**	

INTERNAL MARKS **25 MARKS**

EXTERNAL MARKS AT THE END EXAMINATION **75 MARKS**

MODEL QUESTION

Time: 3 Hours **Maximum Marks: 75**

A. LISTENING **25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks with the exact words heard. 05

B. SPEAKING **30 Marks**

1. Describe the given picture/illustration in your own words 05
2. Imagine you are in an interview and answer the questions 05
3. Imagine, a consultant has come to your department. Introduce him to your subordinates. 05
4. Speak with your immediate boss about the progress you have made.(Dialogue) 05
5. Discuss within the group on the topic of focus in the syllabus. 10

C. WRITING & READING **20 Marks**

1. Find at least five different words (atleast 4 letters long) within the word ENTERTAINMENT. 05

2.a. Frame THREE new questions from the given pattern by changing sets of words with your own.03

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?

b. Make TWO sentences from the given pattern by changing sets of words with your own. 02

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory.	

3. Imagine you are Selvan S.Mohan of Chennai. Prepare a résuméfor the post of Department Manager. 05
4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

I. Guidelines for setting the question paper:

A. LISTENING : ONLY TOPICS related to

POLLUTION /ENVIRONMENT /
GLOBAL WARMING / COMMUNAL HARMONY are to be taken.
These topics are common for all the three types of evaluation.

For 1.& 2. A passage of a minimum of 100 words may be chosen
3. A passage of a minimum of 50 words may be given

B. SPEAKING :

1. A VISUAL / an ILLUSTRATION from the Daily / Magazine can be given.
2. Frequently asked questions in the interviews may be put forth to the students .
3. Questions such as ñIntroduce yourself as an engineer with designationò or ñIntroduce the official visiting your company/departmentò may be asked.
4. Dialogue must be with someone in the place of work.
5. Group of six/eight
   Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

1. Wordsmithy -Words within a word- a vocabulary game
   a. Words should be atleast 4 letters long
   b. Proper nouns do not count
   c. Letters cannot be duplicated.

2. a. & b. Provide five (Questions under section A and Statements under section B).different structures. Students are to substitute and make at least 3 questions from a) and two from b) with some other word/words.
3. Provide some post related to industries.
4. Outline of the project (skeleton/structure)

Only the various headings and subheadings are to be provided. Content is not needed.

II. Guidelines for recording the material on the Focused Topics in the Record note

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
(5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Interview Techniques
2. Effective Persuasive Communication.

3. Non verbal Communication.
4. Intercultural Communication.
5. Business Etiquettes.
6. Entrepreneurship
7. Effective Management
8. Productivity in Industries ï Comparison with developed countries
9. Occupational Accident and First Aid
10. Labour Welfare Acts and Rights

LABORATORY REQUIREMENT:

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4.A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size ï 29ò)
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:

1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley & Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer, Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English ï A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management ï An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna
16. Influence:The Psychology of persuasion by Robert B. Cialdini, Collins.
17. Non verbal communication by Albert Mehrabian, Routledge,2007.
18. Indian Business Etiquette by Raghu palat, JAICO, 2008.

V SEMESTER
C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC510

Subject Title : GENERATION, TRANSMISSION AND SWITCHGEAR

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC510	Generation, Transmission and Switchgear	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
I	Generation of electrical Power	**14**
II	AC and HVDC transmission	**14**
III	Line insulators and underground cables	**14**
IV	Circuit breakers and Over Voltage Protection	**14**
V	Protective relays and grounding	**14**
	Revision Test	**5**
	Total	**75**

RATIONALE

The modern society is so much dependent upon the use of electrical energy and it has become a part of our life. It is mandatory for an electrical engineer to have adequate knowledge of the operation of power generation, transmission and distribution systems. This subject is included to provide basic understanding of power systems.

OBJECTIVES

To understand

- Various methods of conventional power generation.
- Renewable energy sources and power generation
- Grid system and Economics of power generation
- A.C Transmission-Supports, conductors, Effects, Regulation and Efficiency
- H.V.D.C Transmission
- Line Insulators and underground cables
- Circuit breakers, Fuses and Lightning arresters
- Protective relays and grounding.

DETAILED SYLLABUS

EEC510 – GENERATION, TRANSMISSION AND SWITCHGEAR

Unit I Generation Of Electrical Power

Introduction - Conventional methods of power generations ï schematic arrangement and choice of site for Hydel, thermal, nuclear power plants - Advantages and disadvantages - comparison of these power plants.

Principle and types of co generation - Schematic arrangement of diesel, gas and pumped storage power plants - Advantages and Disadvantages. Renewable Energy sources - Basic principle of Solar, Wind, Geothermal, Ocean, Biomass and Tidal Energy sources. Fuel Cells - design and principle of operation ï types of fuel cells-comparison of fuel cells ï efficiency ï advantages ï applications.

Grid or Inter connected system- Advantages of Inter connected systems- Load Transfer through Inter connector-Load curves and Load duration curves-connected load-Average load-Maximum Demand Factor- Plant capacity factor-Load factor and its significance-Diversity factor-Load sharing between base load and peak load plants-Load Dispatching centre stand-alone system.

Unit 1I A.C Transmission And HVDC Transmission

A.C. Transmission

Introduction-Typical Layout of A.C. Power supply scheme- various system of power transmission- Advantages and Disadvantages of A.C Transmission- Advantages of having high Transmission Voltage- Economic choice of Transmission voltage- Elements of a Transmission Line- Economic choice of conductor size- Kelvin's Law- Its limitation.

Over Head Line- Conductor materials and their properties- Line supports- its properties- Types of supports and their applications-spacing between conductors- length of span- Sag in over head lines- Calculation of Sag- When the supports are at equal and unequal levels- Effect of wind and ice loading over the line conductor - Problems- Constants of a transmission line- Transposition of Transmission lines- Skin Effect- Ferranti Effect- Corona ï corona formation and corona loss ï disadvantages & advantages ï factors affecting corona ï methods of reducing corona effect - Classification of O.H. Transmission lines- performance of single phase short transmission line - voltage regulation and transmission efficiency-problems.

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 (Mono polar, Bipolar and Homo polar) - HVDC convertor Station (Schematic diagram only) - Comparison between constant current and constant voltage HVDC systems.

Unit III Line insulators and Underground cables

a)Line Insulators - Types of line insulators ï pin, suspension, strain and shackle insulators ï causes of insulation failure ï testing of insulators ï potential distribution over suspension insulator string ï string efficiency ï methods of improving string efficiency ï problems.

b)Underground cables - Advantages of cables ï various parts of a three conductor UG cable ï properties of insulating materials used in cables ï classification of cables based on voltage rating ï cables for three phase service ï Belted cable ï Screened Cable ï Pressure Cables.

Laying of Cables ï direct laying ï draw in system ï solid system ï their advantages and disadvantages. Grading of cables ï capacitance grading, inter-sheath grading (no derivation & problems). Cable Faults ï OC, SC and earth faults ï Murray Loop test for fault location.

Unit IV Circuit Breakers and Over Voltage Protection

Switch gear- Essential features of Switch gear- faults in a power system (definition only).

Circuit Breakers

Basic principle of circuit Breaker - Arc Phenomenon- methods of Arc extinction- Arc voltage - Restriking voltage and recovery voltage- Rate of rise of restriking voltage- current chopping- Interruption of capacitive current -resistance switching- C.B ratings ï Breaking capacity, making capacity, short time rating - Auto reclosing in circuit Breakers - Classification of Circuit breakers - construction, working principle , merits and demerits of Air Blast Circuit Breaker, Miniature Circuit Breaker(MCB), Earth Leakage Circuit Breaker(ELCB), Residual Current Circuit Breaker(RCCB), SF6 and vacuum C.B- Maintenance schedule for circuit breakers.

D.C is breaking - Problems of D.C breaking - Schematic for HVDC C.B producing current zero.

Fuses - Desirable characteristics - Fuse Element materials-current rating of fuse elements-fusing current-Cut off current- L.V fuses - Rewirable fuse, HRC cartridge fuse, HRC fuse with tripping device - H.V. fuses cartridge type, liquid type and metal clad-fuses-Comparison of fuse and circuit breaker.

Over voltage protection

Voltage surge- causes of over voltage ï 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.

Unit V Protective Relays and Grounding

Protective relays

Basic principles - 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), Distance relay, Differential relay, Negative sequence relay, Induction type reverse power relay, Earth leakage relay.

Static relays - Basic elements of static relay - Schematic diagram and operating principle of smart protective relays - current, impedance, directional, reactance and Mho relays.

Grounding:

Introduction - Equipment grounding - System grounding - Ungrounded Neutral system - Necessity of Neutral grounding ï Methods: Solid grounding, Resistance grounding, Reactance grounding and Resonant grounding - Earthing Transformer.

Text Book:

Sl.No.	Name of the Book	Author	Publisher
1.	Principles of Power Systems	VK. Mehta.	S.Chand &co.

Reference Book:

Sl.No.	Name of the Book	Author	Publisher
1.	Electrical Power System	CL. Wadhawa.	Fourth Edition 2005 New Age International New Delhi
2.	A Course in Electrical Power	Soni, Gupta Bhatnagar	Dhanpath Rai & Co (P) Ltd., New Delhi
3	Electrical Power	S.L. Uppal	Khanna Publishers, New Delhi
4	A Course in Electrical Power	J.B. Gupta.	Katson Publishing House, New Delhi
5	HVDC Power Transmission System & Technology	KR. Padiyar.	New Age International New Delhi
6	Electrical Power System Planning	A.S.Pabla	McMillan India Ltd.,New Delhi
7	Digital Protection ï Protective relaying from electromechanical to Microprocessor	L.P.Singh	New Age International New Delhi
8	Power system Protection and Switch gear	B.Ram D.N.Viswakarma	TMH 1995

Sl.No.	Name of the Book	Author	Publisher
9	Non-conventional Energy Sources	G.D.Rai	Khanna Publishers, Delhi
10	Power System Protection and Switchgear	B.Ravindranath M.Chadar	New Age International

GENERATION, TRANSMISSION AND SWITCHGEAR

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) List the sources of electrical energy.

(2) Briefly explain the Grid System.

(3) Compare different types of fuel cells.

(b) (1) with a neat diagram explain the Schematic arrangement of Thermal Power Station.

(2) Draw and explain the pumped storage power plant.

II. (a) (1) State Kelvin`s Law.

(2) Write short note on Skin effect.

(3) Briefly explain transposition of Transmission line.

(b) (1) Derive the equation for sag when the supports are at equal levels.

(2) List the advantages and disadvantages of HVDC transmission.

III (a) (1) State the necessity of line insulators.

(2) Sketch the construction diagram of UG cable and mark the parts of it.

(3) Mention the types of UG Cables.

(b) (1) Explain any one suspension type insulator with neat diagram.

(2) With a neat diagram explain the procedure for laying of UG Cables.

IV (a) (1) What is óArc Phenomenonõ?

(2) Discuss the working principle of Circuit breaker.

(3) Compare MCB, ELCB, RCCB.

(b) (1) Explain the construction and working principle of air blast circuit Breaker.

(2) With neat sketch, explain any one type of lightning arrester.

V (a) (1)) Briefly explain the voltage differential relay.

(2) List the requirements of protective relaying.

(3) Discuss the necessity of neutral grounding.

(b) (1) With a neat diagram explain, Induction type over current relay.

(2) Explain in detail about any two types of grounding.

GENERATION, TRANSMISSION AND SWITCHGEAR

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Explain base load and peak load plants

(2) Define; Maximum Demand and load factor.

(3) Explain briefly the blocked rate tariff and three part tariff.

(b) (1) Draw and explain the schematic arrangement for Hydro power station.

(2) A generating station has a maximum demand of 50,000 kw. Calculate the cost per unit generated from the following data;_

Capital cost ... Rs. 110 x 10^6

Annual cost of fuel and oil ... Rs. 12 x 10^6

Taxes, wages and salaries etc. .. Rs. 8.5x10^6

Annual load factor ... 40%

Interest and depreciation .. 12%

II (a) (1) State Kelvin`s law.

(2) Briefly explain transposition of transmission line conductors.

(3) Discuss the effect of line inductance in a transmission line.

(b) (1) An overhead line has a span of 250 m between level supports. The conductor has circular cross section of 1.29cm^2 and weight of

1.15kg/m run. The allowable tension is 2750 kg. C

Calculate sag if the wind pressure is 4 gm/cm^2 of the projected area.

(2) List the advantages and disadvantages of HVDC transmission.

III (a) (1) List the requirements of line insulators and state the materials used forit.

(2) Define; String efficiency for insulators.

(3) Write about the grading of cables.

(b) (1) Explain the reason for failure of insulators.

(2) With a neat sketch, explain the construction, advantages and disadvantages of oil filled cables.

IV (a) (1) What are the merits of an air blast circuit breaker.

(2) Explain the term recovery voltage and breaking current.

(3) Write a short note on phenomenon of lightning.

(b) (1) Explain the construction and operation of an oil minimum circuit breaker.

(2) Explain about the over voltage protection.

V (a) (1) Explain the working of current differential relay

(2) List any four characteristics of relay.

(3) what is grounding?.

(b) (1) Explain the working principle of Earthing Transformer.

(2) Explain with a neat sketch the working of induction type reverse power relay.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC520

Subject Title : MICRO CONROLLER AND EMBEDDED SYSTEMS

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC520	Microcontroller And Embedded Systems	5	75	25	75	100

Topics and Allocation

Unit	Topic	Time (Hrs)
I	8051 Microcontroller	14
II	Programming concepts	14
III	I/O, Timer and Serial Communication	14
IV	Interrupts and Interfacing Techniques	14
V	Embedded Systems	14
	Revision and Test	5
Total		**75**

RATIONALE:

The enormous growth in the field of automation brings in extreme sophistication and comfort in day to day life. Microcontrollers and embedded systems plays vital role in this area. The knowledge and hands on experience in micro controllers and embedded systems open up various venues to the diploma students in industries like home appliances, robotics, automobiles etc.,

OBJECTIVES

To Understand

- Architecture of 8051 Microcontroller.
- Functions of various registers.
- Serial data communication concepts.
- Interrupt structure of 8051.
- Various addressing modes.
- Instruction set of 8051.
- Programming techniques and Simple programs using 8051.
- Block diagram and control word formats for peripheral devices.
- Interface with RS232C, 8255, ADC and DAC.
- Various application of 8051 Microcontroller.
- Arm processors and simple programs using arm processor.

DETAILED SYLLABUS

EEC520 – MICROCONTROLLER AND EMBEDDED SYSTEM

Unit I 8051 Microcontroller

Introduction - 8051 Architecture ï Advantages of microcontroller ï Oscillator and Clock of 8051 ï Program Counter and Data Pointer ï A and B CPU Registers ï PSW ï Memory Organisation ï Stack ï Special Function Registers ï GPIO ï Timers ï Serial Data ï Input / Output ï Interrupts Structure ï timer- Flag Interrupt ï External Interrupt ï Reset ï Interrupt Control ï Interrupt Priority ï Interrupt Destinations ï Pin Configuration of 8051 and their functions ï Overview of 8051 family.

Unit II Programming Concepts

Programming Tools and Techniques ï Addressing Modes ï Instruction set - Interrupts and returns. 8051 Operational code Mnemonics ï Program examples ï 8 bit Addition / Subtraction , 8 bit Multiplication / Division, 16 bit Addition / Subtraction, largest / smallest of n numbers, sum of array of n numbers, ascending / descending order of arranging n numbers, BCD to ASCII conversion, ASCII to BCD conversion, Odd parity Generators, Even parity Generator, time delay routine.

Unit III I/O, Timer, Serial Communication

I/O

Bit addresses for I/O and RAM ï I/O programming ï I/O bit manipulation programming

TIMER

Programming 8051 timers ï Timer 0 and timer 1 registers ï Different modes of timer ï Mode 0 programming ï Mode 1 programming ï Mode 2 programming ï Counter Programming ï Different modes of counter ï Mode 0 programming ï Mode 1 programming ï Mode 2 Programming ï Simple programs

Serial Communications

Basics of serial programming ï RS232 standards ï 8051 connection to RS232 ï 8051 serial communication programming ï Programming 8051 to transmit data serially ï Programming 8051 to receive data serially.

Unit IV Interrupts and Interfacing techniques

Interrupts

8051 Interrupts ï Programming timer interrupts ï Programming external hardware interrupts ï programming the serial communication interrupt ï interrupt priority in 8051 ï simple programs.

Interfacing Techniques

IC 8255 ï Block Diagram ï Modes of 8255 ï Interfacing external memory to 8051 - Keyboard Interface - Display interface ï LCD interface ï ADC and DAC Interface - Traffic Light controller ï

Temperature controller with ON / OFF control system, Stepper motor interface (Full and Half stepping) ï DC motor interface ï solenoids and relays interface ï Frequency and period measurements.

Unit V Embedded Systems

Introduction ï Processor in the system ï Software Embedded into a system ï Introduction to ARM Processor ï ARM architecture overview ï Instruction set summary ï Simple programs using ARM processor ï 8 Bit addition ï I/O Device interfacing.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Micro controllers, principles and applications.	Ajit pal	PHI ltd., 2011
2.	Microprocessor and Microcontroller	R. Theagarajan	SciTech Publication.
3.	The 8051 Microcontroller : Architecture Programming and Applications	Kenneth.J.Ayala,	Penram International Publication.

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Digital Design	M. Morris Mano	Third Edition, Prentice Hall 2002.
2.	Analog Interfacing to Embedded Microprocessor real world design	Stuart - R. Ball P.E.	ISBN 0 7506 7723 6.
3.	Embedded System	Raj Kamal	Tata McGraw Hill Publishing Co., New Delhi
4.	LPC 2148 user manual	Philips Semiconductors	Koninklijke Philips Electronics N.V. 2005

MICROCONTROLLER AND EMBEDDED SYSTEM

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Explain the immediate addressing modes in 8051 microcontroller.

(2) Explain with a simple example, how data can be exchanged in 8051 microcontroller.

(3) Explain the bit level logical operation in 8051 microcontroller.

(b) (1) Explain the PUSH and POP operation in 8051 microcontroller.

(2) Explain the data transfer instruction used in 8051 microcontroller.

II. (a) (1) Explain the jump instruction in 8051 microcontroller, with an example.

(2) Explain the assembler derivatives of 8051 microcontroller.

(3) Explain the signed binary addition with an example.

(b) (1) Briefly explain the CALL and returns in 8051 microcontroller.

(2) Write a 8051 microcontroller program for 8 bit division.

III. (a) (1) Explain the logic diagram of 8051 microcontroller timer.

(2) What are the different modes of timer.

(3) Write a simple program to transmit data serially..

(b) (1) Explain the different modes of Timer/counter operation.

(2) Explain the different modes of serial data transmission.

IV. (a) (1) Write short notes on external interrupts.

(2) Draw the circuit for interfacing of ADC with 8255.

(3) Explain the interfacing of DC motor with 8051.

(b) (1) Explain the block diagram of 8255 with a neat sketch.

(2) Explain how LCD is interfaced with 89c51 microcontroller with a neat block diagram.

V. (a) (1) What is embedded system?

(2) List out the processors used in embedded system

(3) List out the features of ARM processor

(b) (1) Explain the process of converting assembly language program into machine implemented software file

(2) Explain the ARM processor architectural overview

MICROCONTROLLER AND EMBEDDED SYSTEM

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Describe Direct Addressing mode with examples.

(2) What are single bits Instructions? Give examples.

(3) Describe the function of the following instructions:-

(i) XCH A, OFOH

(ii) CPL A

(b) (1) Describe Data transfer instructions with examples.

(2) Describe the Rotate and SWAP operations of 8051.

II. (a) (1) Explain Signed Addition.

(2) How is Division performed in 8051?

(3) Explain the function of LJMP and SJMP instructions of 8051.

(b) (1) Explain in detail the various Arithmetic instructions of 8051.

(2) Explain the uses of Assembler ASM 51.

III. (a) (1) Explain the function of TCON Register.

(2) Write a program for counter in mode 2 to count the pulses and display the state of The TLI count.

(3)Discuss briefly about I/O programming.

(b) (1) Explain the modes of Timer/Counter operation in 8051.

(2) How will you program the 8051 to transmit data serially?

IV. (a) (1) How are Interrupts enabled and disabled in 8051?

(2) Explain the commands of LCD display interface.

(3) Explain the Interfacing of DC motor with 8051.

(b) (1) Draw the Interface circuit of 8255 with 8051 and explain.

(2) Describe the modes of operation of 8279 Programmable keyboard display Interface.

V. (a) (1) what is embedded system?

(2) List out the processors used in embedded system

(3) List out the features of ARM processor

(b) (1) Explain the process of converting assembly language program into machine implemented software file

(2) Explain the ARM processor architectural overview

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC530

Subject Title : INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Name of Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Autonomous Exam	Total
EEC530	INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP	5	75	25	75	100

Topics and Allocation

Unit	TOPIC	TIME (hrs)
I	**PRINCIPLES OF MANAGEMENT**	14
II	**PRODUCION PLANNING AND QUALITY CONTROL**	14
III	**MARKETING FUNCTIONS, INDUSTRIAL RELATIONS AND SAFETY**	14
IV	**ENTREPRENEURSHIP AND VARIOUS INSTITUTIONS PROMOTING ENREPRENEURSHIP**	14
V	**1.STARTING OF AN ENTERPRISE** **2. PROJECT REPORT**	14
	Revision and Test	5
	Total	75

RATIONALE:

In developing countries like India, Entrepreneurial development plays vital role in National Development. Entrepreneurial development takes place when a person with required knowledge and skills wants to become an Entrepreneur. This subject aims to motivate diploma students to become an entrepreneur by imparting required knowledge about Industrial Management and Entrepreneurship.

OBJECTIVE:

- To understand the different types of ownership in industry.
- To understand the scientific management
- To organise the different activities of the plant
- To select the plant location and product
- To acquire better knowledge about decision making and communication
- To understand the important factors of production planning control
- To carryout suitable effective methods for inventory control
- To maintain good quality control
- To understand the various quality certification schemes
- To understand the different marketing techniques
- To select the suitable advertising techniques
- To understand the different factory acts for employee welfare
- To appraise the safety performance
- To develop the traits required for entrepreneur
- To know the various institutions promoting entrepreneurship
- To understand the things behind starting of an enterprise
- To prepare project report for starting enterprise

DETAILED SYLLABUS

EEC530 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

UNIT I: PRINCIPLES OF MANAGEMENT

Role of industry ï Types of ownership-Proprietorship, partnership-Private limited ï Public limited ï Industrial co-operatives ï Scientific management ï Functions of management.

Organization - Types of organization ï line-staff-functional organization ï Functions of manager ï Directing - Leadership ï styles of leader ship ï qualities of a good leader ï Decision making ï Communication ï Motivation ï Group dynamics.

Product selection ï Site selection ï Plant layout - Principles of a good layout ï types ï process, product and fixed position ï techniques to improve layout - Factors influencing plant location.

UNIT II: PRODUCTION PLANNING AND QUALITY CONTROL

Production planning and control:

Introduction ï Major functions of production planning and control ï Pre-planning ï Methods of forecasting ï Routing ï Scheduling ï Despatching and controlling ï Concept of PERT, CPM (Description only) ï Inventory control ï ABC analysis of safety stock.

Production ï types ï Mass production ï batch production and job order production ï Economic Batch Quantity (EBQ) ï Purchasing procedures.

Quality control:

Definitions ï objectives ï types of inspection ï first piece , floor and centralised inspection ï advantages and disadvantages ï Quality control ï Statistical quality control ï Types of measurement ï method of variables ï method of attributes ï uses of X,R, p and c charts ï operating characteristics curve- sampling inspection ï single and double sampling plan ï concept of ISO 9001:2008 Quality management registration certification procedure ï Benefits of ISO to the organisation.

UNIT III MARKETING FUNCTIONS, INDUSTRIAL RELATIONS AND SAFETY

Marketing ï Definition ï Information ï Functions ï Pricing policy ï Pricing techniques - Sales ï Definition ï Personal selling ï Promotion mixï Advertising ï Sales packaging ï Promotion techniques.

Trade unions ï Industrial Disputes -settlement of industrial disputes ï Collective bargaining ï Welfare concepts ï Rights and responsibilities of employer and employee ï Factories act 1948 ï Industrial dispute act 1947 ï Trade unions act 1926 ï ESI act 1948 ï Child labour act.

Process safety ï Hazard analysis ï Risk analysis ï Common causes of accidents ï Safety training ï Electrical hazard ï Fire hazard ï Explosion hazard ï First aid.

Electric shock ï Effects of electric shock ï factors influencing the electric shock - Precautions against electric shock ï cure of shock - Treatment for electric shock - artificial respiration - fire hazards due to electricity - protective devices ï role of safety engineer ï IE Rules on safety ï rule 33, 43, 44, 48and 57.

UNIT-IV ENTREPRENEURSHIP & VARIOUS INSTITUTIONS PROMOTING ENTREPRENEURSHIP

Need, Role and importance of Entrepreneurship ï characteristics of an entrepreneur. Entrepreneurial Growth ï Role of the Government and non-government agencies in promoting Entrepreneurship in India ï Promotion role ï Supportive role ï Regulator Role.

Role of various Agencies in Promoting Entrepreneurship:

Entrepreneurship Development programs (EDPS). ï Industrial Estates ï Khadi and village industries commission (KVIC) ï Small industries service institutions (SISI) ï State industries promotions corporations of Tamil nadu (SIPCOT) ï Self employment schemes ï small industries development corporation (SIDCO) ï Technical Consultancy Organisation (TCO) ï Small Industry Extension Training Institute (SIETI) ï The National Institute of Small industries Extension Training (NISIET) ï National Small industries Corporation(NSIC) ï Small Industries Development Organisation(SIDO) ï District Industries Centre(DIC) ï Micro, Small and Medium Enterprises (MSME).

Role of various financial institutions in Promoting Entrepreneurship:

Industrial Development Bank Of India (IDBI) ï Industrial Finance Corporation Of India (IFCI) ï Industrial Credit Corporation of India(ICICI) ï Industrial Investment Bank of India (IIBI) ï Small Industries Development Bank Of India(SIDBI) ï Tamil Nadu Industrial Investment Corporation(TIIC) ï Commercial Banks

UNIT V

1. STARTING OF AN ENTERPRISE

Various Stages of Starting An enterprise ï Business Idea Generation Techniques - Identification of Business Opportunities ï Marketing Feasibility ï Financial and Economic Feasibility ï Technical Feasibility ï Legal Feasibility ï Managerial Feasibility ï Location Feasibility ï Other Feasibilities.

Small Scale Industries ï Role of SSI to the growth of Indian economy ï benefits to SSI ï Problems of Small Enterprise ï Small exporters ï Export promotion measures ï Export procedures ï problems in export ï Import.

2. PROJECT REPORT

Project Report ï uses - Contents of Project Report ï Cover Page ï Table Of Content ï Executive Summery ï Industry and Company ï Products and Services ï market research and analysis ï the Economics of Business ï Marketing plan ï Design and Development plans ï Manufacturing and Operational Plan ï Management Team ï Overall Schedule ï Risks and Problems ï Financial plan ï Proposed Company Offerings ï Appendices. Project appraisal (Meaning only)

TEXT BOOKS:

Sl.No.	Name of the Book	Author	Publisher
1.	Industrial Engineering and Management	O.P.Khanna	Dhanpat raj publication
2.	Engineering Economics and Management	T.R.Banga & S.C.Sharma	Mc.Graw Hill, Edition-2-2001, new delhi
3.	Entrepreneurial Development	Dr. Jayashree Suresh,	Marghan Publications

REFERENCE BOOKS:

Sl.No.	Name of the Book	Author	Publisher
1.	Essentials of management	Herald Koontz and Heinz	Mc.Graw hill publishing company
2.	Principles of management	M. Govindarajan and S. Natarajan	Prentice Hall of india pvt. Ltd.,
3.	Entrepreneurial Development	Dr. S.S. Khanka	S.Chand &co.
4.	Entrepreneurship	Alpana Trehan	Dreamtech press

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

1. a. 1) List the important factors for plant site selection.

2) List the functions of management.

3) Name and define different types of ownership

b. 1) Explain in detail about types of plant layout and techniques to improve plant layout

2) Explain scientific management and functions of management.

2. a. 1) Define Quality of an article and list the importance of quality control

2) What are the different advertisement techniques?

3) Discuss the various pricing techniques.

b.. 1) Explain methods of production and EBQ method

2) Explain PERT and CPM.

3. a. 1) State the principle of material handling.

2)Mention the common types of sampling plans.

3)Discuss the importance of Forecasting.

b. 1) Discuss the functions of trade unions and its responsibilities.

2) Explain Hazard analysis and Risk analysis.

4. a. 1)What are supportive role of Govt. & Non-Govt. agencies in Entrepreneurial Growth in India.

2) List out any 4 Financial Institutions / agencies for Entrepreneurial development.

3) What are the functions of Technical Consultancy Organisations?

b. 1) Explain about the various schemes offered by TIIC.

2) Briefly explain about the role, functions Entrepreneurial Development programmes.

5. a. 1) What are the contents to be given in the cover page of a project report?

2) What is business idea generation and briefly explain.

3) What is Technical feasibility and briefly explain.

b. 1) What are the various stages of starting an Enterprise? Explain briefly.

2) What is project report? Mention its importance.

INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

1. a. 1) Briefly discuss Motivation.

2)What are types of industrial organization?

3)List the advantages of Line organization.

b. 1) Write the types of organization and explain each type.

2) Explain the principles of plant layout and sketch out a typical plant layout.

2. a. 1)Write a short note on purchase procedures.

2)Write a short note on routing and scheduling.

3)List benefits of ISO to organisation.

b. 1)Explain various types of inspection, their advantages and disadvantages.

2) Explain production, planning and control.

3..a. 1) Give the advantages of factory act.

2)What are the factors to be considered while fixing compensation to the workers?

3)State the functions of trade union.

b. 1)Write the salient points in factories act 1948.

2)Explain the fire hazard control methods.

4. a. 1) What is the promotional role of Govt. & Non-Govt. agencies in Entrepreneurial growth in India?

2) List out any 4 promotional and Development institutions agencies for the Entrepreneurial Development.

3) What are the objectives of SIPCOT?

b. 1) Discuss about the role of commercial Banks in the Entrepreneurial Development.

2) Explain about the various schemes offered by the MSME for the Entrepreneurs.

5. a. 1)What is the meaning of project report

2) Mention about the importance of marketing feasibility.

3) Explain briefly about project appraisal.

b. 1) List out the table of contents of the project report and explain briefly.

2) What are the benefits offered by the Govt. for SSI?

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC541

Subject Title : CONTROL OF ELECTRICAL MACHINES

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC541	Control Of Electrical Machines	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs.)
I	Control Circuit Components	14
II	AC Motor Control Circuits	14
III	Industrial Control Circuit	14
IV	Programmable logic Controller	14
V	PLC Programming	14
	Revision, Test	**5**
	Total	**75**

RATIONALE

It is important for an electrical engineer to control the electrical machines which are handled by him, either manually or automatically. The scope of this subject is to teach various methods of controlling Electrical machines, by using hard wired control circuit and by PLC programming.

OBJECTIVES

To understand

- Electrical control circuit elements including various types of industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
- AC motor control circuits for acceleration control, speed control, direction control, braking control and jogging using contactors.
- Different control circuits for industrial applications.
- Basics of programmable logic controller.
- Basics of PLC programming

DETAILED SYLLABUS

EEC541 - CONTROL OF ELECTRICAL MACHINES

Unit I Control circuit Components

Switches ï Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and Proximity switches.

Relays ï Voltage relay, dc series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer).

Over current relay ï Bimetallic thermal over load relay and Magnetic dash pot oil filled relay.

Timer ï 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.

Unit II AC motor control circuits

Motor current at start and during acceleration ï No load speed and final speed of motor ï DOL starter ï Automatic auto transformer starter (open circuit and closed circuit transition) ï Star/Delta starter (semi automatic and automatic) ï Starter for two speed, two winding motor ï Reversing the direction of rotation of induction motor ï Plug stopping of the motor ï Dynamic braking ï Three step rotor resistance starter for wound induction motor ï Secondary frequency acceleration starter.

Unit III Industrial Control Circuits

Planner machine ï Contactor control Circuit ï Logic control circuit ï Skip hoist control ï Automatic control of a water pump ï Control of electric oven ï Control of air compressor ï Control of over head crane ï Control of conveyor system ï Control of elevator ï Trouble spots in control circuits ï General Procedure for trouble shooting.

UNIT IV Programmable Logic Controller

Automation ï Types of automation (manufacturing and nonmanufacturing) - advantages of automation ï PLC Introduction ï Block diagram of PLC ï principle of operation ï modes of operation ï PLC scan ï memory organization ï input module (schematic and wiring diagram) ï output module (schematic and wiring diagram) ï Types of Programming Devices ï Comparison between hardwired

control system and PLC System ï PLC Types (Fixed and Modular) ï Input Types ï Output Types ï Criteria for selection of suitable PLC ï List of various PLCs available.

UNIT V PLC Programming

Different programming languages ï ladder diagram ï Relay type instruction ï Timer instruction ï ON delay and OFF delay Timer ï Retentive Timer Instruction ï Cascading Timers ï Counter Instruction ï UP Counter ï Down Counter ï UP/DOWN Counter - ladder logic diagram for DOL Starter, Automatic STAR-DELTA Starter ï rotor resistance starter and EB to Generator changeover system.

Text Books:

Sl.No.	**Name of the Book**	**Author**	**Publisher**
1.	Control of Electrical Machines	S.K.Bhattacharya	New Age International Publishers, New Delhi
2.	Operation and Maintenance of Electrical Machines	B.V.S.Rao	Khanna Publishers, New Delhi
3.	Exploring Programmable Logic controllers with Application.	Pradeep Kumar Srivastava.	BPB Publications

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Automation, Production System And Computer-Integrated Manufacturing	Mikell P. Groover	Prentice Hall of India (P) Ltd., New Delhi

CONTROL OF ELECTRICAL MACHINES

MODEL QUESTION PAPER -I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) Briefly explain the working of float switch

(2) Write notes on frequency response relay

(3) Explain briefly the working of a bimetallic thermal overload relay

b) (1) Explain with the neat sketch, the working of dash pot overload relay

(2) With neat sketch explain the constructional details of solenoid type Conductor.

II. a) (1) compare the semi ï automatic and fully automatic star ï delta starters.

(2) explain the meaning of open circuit for auto-transformer starting closed transition with neat power.

(3) Draw the control circuit for reversing the direction of ration of induction motor

b) (1) Explain the working of auto-transformer starting closed transition with neat power and control circuit

(2) Draw the connection diagram of winding for two speed control of induction motor and explain.

III. a) (1) Draw the control circuit of automatic control of water pump.

(2) Mention the various components used in skip hoist control and their function.

(3) What are the various trouble spots in control circuit? state the causes and suggest suitable remedy.

b) (1) Draw and explain the logical control circuit of planner machine.

(2) What are the various trouble spots in control circuits? State the causes and suggest the suitable remedy

IV. a) (1) Differentiate between word and byte.

(2) What is meant by NC coil?

(3) what is meant by auxiliary contactor?

b) (1) Discuss in detail about PLC operation and various Scans available.

(2) Explain the memory organization of standard PLCs

V. a) (1) Write short note on counter instructions.

(2) What are cascading counters?

(3) Write a note on ON delay and OFF delay timer.

b) (1) Develop ladder diagram for Rotor resistance starter.

them.

(2) Develop ladder diagram for a EB to generator change over system.

CONTROL OF ELECTRICAL MACHINES

MODEL QUESTION PAPER ï II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I a) (1) Briefly explain the Zero speed switch and Where it is used?

(2) Explain the limit switches and pressure switches.

(3) Explain a push button and a selector switches.

b) (1) Explain the working of an inductive proximity switch with a neat sketch of its internal parts.

(2) Explain the solenoid value operation with neat sketch.

II a) (1) Explain semi automatic star delta starter?

(2) Explain auto transformer starter?

(3) Define kordorfer method at starting?

b) (1) Explain the working at an automatic star-Delta starter with neat sketch

(2) Draw the connection diagram at winding for two speed control in I.M?

III a) (1) What is planer machine? State any one of the method of heat control of oven.

(2) Explain any two trouble spots in a control circuit.

(3) Explain to reverse the direction of rotation of a three phase induction

motor?

b) (1) Explain the control circuit of Skip hoist with neat sketch

(2) Explain with a neat sketch, the control of a conveyor system by sequential starting of conveyor motors.

IV. a) (1) List out various parts of PLC.

(2) Write short notes on expansion modules of PLC.

(3) What are the advantages of PLC over hard wire logic.

b) (1) Explain the various scans involved in PLC operation.

(2) Draw the basic diagram of PLC and give brief account on each block.

V. a) (1) Discuss about statement list programming method of PLC.

(2) Explain ôNOô and ôNCô connections

(3) Explain ñon delay timerò and ñoff delayò timer.

b) (1) what are the counting operations available in standard PLCs? Explain them.

(2) Develop relay logic diagram of star delta starter and convert it into logic diagram.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC542

Subject Title : PROGRAMMABLE LOGIC CONTROLLER

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC542	Programmable Logic Controllers	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
I	Introduction to Programmable logic controller	14
II	Input and Output Modules	14
III	Basic PLC Programming	14
IV	Special Instructions of PLC programming and Installation & Trouble shooting of PLC	14
V	Data Acquisition Systems	14
	Revision, Test	**5**
	Total	**75**

RATIONALE

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

OBJECTIVES

To Understand

- Hard-wire and PLC based control system
- Block diagram of a PLC
- Principle of working of PLC
- Various types of inputs
- Organization of modular PLC
- Give examples of practical PLCs
- Output addressing schemes for few popular PLCs
- Various symbols used in PLC system
- Various relay logic functions
- The Ladder, FBD, STL, CSF methods of PLC programming
- PLC implementations for NO / NC contacts
- Timer, counter, data manipulating and math functions in PLC
- PID and PWN functions available in PLCs
- Block schematic and PLC ladder implementations for Automatic star-delta starter and 4-floor lift system
- Display character using 7 segment LED
- Types of communication cables
- organization and working of Field bus system
- Activities in the various levels of an industrial control system
- Need for a data acquisition system
- Need for data loggers
- Working of components in a data acquisition system
- Different modes of a digital controller
- Components of a SCADA system

DETAILED SYLLABUS

EEC542 - PROGRAMMABLE LOGIC CONTROLLER

Unit I Introduction to Programmable Logic Controller

Introduction to open loop and closed loop control system ï P, PI, PID controllers ï Block diagram representation of physical systems ï Laplace transformation technique ï Transfer function model approach - PLC evolution ï hardwire control system compared with PLC system - advantages of PLCs ï criteria for selection of suitable PLC - Block diagram of PLC ï principle of operation ï CPU ï memory organization ï I/O modules ï Input types ï Logic, Analog ï pulse train ï expansion modules ï power supplies to PLC ï modular PLCs - list of various PLCs available

Unit II Input and Output Modules

a)Input Modules - Discrete input module ï AC input module ï DC input module ï sinking and sourcing ï sensor input ï special input modules ï Sensors ï limit switch, reed switch, photo electric sensor, inductive proximity sensor ï Input Addressing scheme in important commercial PLCs.

b)Output modules - Discrete output module ï TTL output module ï Relay output ï Isolated output module ï surge suppression in output ï Analog outputs ï open collector output. Output addressing scheme in important commercial PLCs.

Unit III Basic PLC Programming

Symbols used ï relays and logic functions ï OR, AND, Comparator - Programming Devices ï programming methods ï STL and CSF, FBD and Ladder methods ï Typical low level language instruction set for a PLC - simple instructions ï Programming NC and NO contacts - EXAMINE ON and EXAMINE OFF instructions - online, offline methodsï Latch and Unlatch outputs ï pulse edge evaluation ï timer instructions ï on-delay and off-delay timer. Counter instructions ï UP / DOWN countersï Timer and Counter applications - Converting simple relay ladder diagram into PLC relay ladder diagram - Sample PLC implementations for DOL starter, Automatic Star-Delta Starter, Rotor Resistance starter, 4 - floor Lift system, fluid filling operation and Packing Process.

Unit IV Special Instructions of PLC programming and Installation & Trouble shooting of PLC

Additional capabilities of PLC - Program control instructions ï Data manipulating instructions ï Math instructions ï PID and PWM functions ï Move Functions ï Program for Display character using 7 segment LED and Conveyor control system - PLC Memories ï PLC Scan - PLC based control system

architecture ï Types of Communication Cables (PLC to various devices like Motor, sensor, PC, PLC etc...) ï RS 232 & 432 ï Field bus - Profibus ï Modbus - Installation of PLC ï Fault Categories ï Installation faults and Operation faults ï Good design Practice

Unit V Data Acquisition Systems

Computers in Process control ï Data Loggers ï Data acquisition systems (DAS) ï Alarms ï Direct Digital Control (DDC) - Characteristics of digital data ï Controller software ï Digital Controller modes ï Error, Proportional, Derivative and composite control modes. Computer Process interface for Data Acquisition and control ï Computer control loops.ï Supervisory Digital Control (SCADA) - introduction and brief history of SCADA ï SCADA Hardware and software ï Landlines for SCADA ï use of modems in SCADA ï SCADA with LAN

Text Book :

Sl No.	**Title of the Book**	**Author(s)**	**Publishers**
1.	Introduction to Programmable Logic Controllers	Gary Dunning	Thomson Delmar Learning

Reference Books :

Sl.No.	**Name of the Book**	**Author**	**Publisher**
1.	Programmable controllers hardware software and applications	George L. Battin	Tata McGraw-Hill Education
2.	Programmable Controllers	Richard Cox	Thomson Delmar Learning
3.	Teach yourself TCP/IP	Joe Casad	Pearson Education
4.	Programmable Logic Controllers ï PLC manual	Petruzella	Tata McGraw-Hill Education
5.	Control Systems	Nagrath & Gopal	New Age International

PROGRAMMABLE LOGIC CONTROLLER

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) List out various parts of PLC.

(2) Write short notes on expansion modules of PLC.

(3) What are the advantages of PLC over hard wire logic.

b) (1) Explain the various scans involved in PLC operation.

(2) Draw the basic diagram of PLC and give brief account on each block.

II. a) (1) Write a note on analog output module.

(2) Wrote short notes on limit switch and proximity switch.

(3) Write short notes on Master Control Relay.

b) (1) Explain in detail about serial port communication.

(2) Write a Ladder Logic Diagram for a bottle filling process.

III. a) (1) Differentiate latched and unlatched outputs.

(2) Write short notes on ultrasonic sensor.

(3) Mention any four temperature sensors.

b) (1) Discuss in detail about the various pressure transducers.

(2) Develop relay logic diagram of star delta starter and convert it into logic diagram.

IV. a) (1) List some program control instruction?

(2) Explain PLC memory.

(3) What is PIB and PWM functions.

b) (1) Explain in detail about the PLC based control system architecture.

(2) Discuss the program for display character using 7 segment LED.

V. a) (1) Give a note on Direct Digital Controller.

(2) What is the difference between DDC and SCADA.

(3) Write short notes on data loggers.

b) (1) Explain in detail how interfacing of synchronous motor drive is implemented.

(2) Explain the digital controller modes, Proportional, Derivative and Integral

PROGRAMMABLE LOGIC CONTROLLER

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) Differentiate between word and byte.

(2) What is meant by NC coil?

(3) what is meant by auxiliary contactor?

b) (1) Discuss in detail about PLC operation and various Scans available.

(2) Explain the memory organization of standard PLCs

II. a) (1) Discuss about statement list programming method of PLC.

(2) Explain ónOô and ónCô connections

(3) Explain ñon delay timerò and ñoff delayò timer.

b) (1) what are the counting operations available in standard PLCs? Explain them.

(2) Develop ladder logic control for 4 floor lift system and explain.

III. a) (1) What is meant by Proximity sensor.

(2) Write short notes on photo electric sensor.

(3) State the working principle of vibration sensor.

b) (1) Explain in detail about

i) Fiber optic sensor

ii) Pyro electric sensor

(2) Discuss how interfacing of analog sensors with PLC is implemented.

IV. a) (1) Explain the types of communication cables.

(2) Explain RS232 and RS432.

(3) Write some instructions for data manipulation.

b) (1) Explain in detail about the fault categories and steps to deduct the fault and its operation.

(2) Discuss the additional capabilities of PLC and explain the PLC memories.

V. a) (1) What do you understand by data logging?

(2) Write short notes on HMI.

(3) What is meant by PI controller?

b) (1) Discuss about various modes of digital controller.

(2) What do you understand by SCADA system? Give a brief account on it

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC543

Subject Title : ELECTRICAL MACHINE DESIGN

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC543	Electrical Machine Design	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
I	Electrical machine design ï basic consideration	**14**
II	Magnetic Circuit Calculations	**14**
III	Design of Transformer	**14**
IV	Design of dc machines	**14**
V	Design of ac machines	**14**
	Revision, Test	**5**
	Total	**75**

RATIONALE

Across the world there are many electrical industries, manufacturing different kinds of electrical machines like transformers, DC generators, DC motors, AC motors and alternators. Their rating starts from hundreds of WATTS / VA to few KW / KVA or even in MW / MVA. Hence it is necessary to include electrical machine design as one of the subject at diploma level courses.

OBJECTIVES

To understand

- Construction of transformer
- Design problems of the transformer
- Factors affecting the size of rotating machines
- Magnetic circuit calculations
- Magnetic leakage and slot dimension
- Basic principle of electric circuits
- Design armature core and winding
- Design field coil and field winding
- Design commutator, brushes and inter poles
- Output equation of single phase transformer
- Output equation of three phase transformer
- Core and tank with cooling tubes
- Effect of frequency on iron loss
- Single phase induction motor
- Main and auxiliary stator winding

DETAILED SYLLABUS

EEC543 - ELECTRICAL MACHINE DESIGN

Unit I Electrical machine design – basic consideration

Standardization and standards ï specification of transformer , dc machines and ac machines ï design and constructional elements of transformer, rotating machines ï Materials ï conducting, magnetic and insulating materials ï losses ï electrical and magnetic losses ï temperature-rise ï class of duty ï limits of temperature rise.

Unit II Magnetic Circuit Calculations

Calculation of magnetizing force ï magnetic force for the gap ï magnetic force for the teeth ï leakage flux ï leakage reactance. Rotating machines ï salient field poles ï non salient field poles ï armature ï slot leakage reactance.

Unit III Design of Transformer

Important considerations ï core and shell types ï distribution transformer ï generator transformer ï transmission transformer ï core section ï clearance ï yoke section. Main dimension ï single phase core type transformer ï three phase core type transformer ï output coefficient ï voltage per turn ï specific magnetic and electric loading of transformer. Winding design ï cross over, helix, disc and disc helix.

Unit IV Design of dc machines

Important design consideration ï number of poles ï advantages of large number of poles ï air gap ï armature slot ï current density ï field system ï commutator ï influence of thyristor supply ï design of large dc motor. Specific magnetic and electric loading of dc machines ï flowchart to estimate for KW and dimension.

Unit V Design of ac machines

Ac machine design consideration ï power equation ï separation of diameter and length ï problems. Three phase induction motor ï important design consideration ï standard frames and stampings ï gap length ï flux density ï current density - power factor ï efficiency ï slot combination ï winding - design of 3 phase induction motors. Three phase synchronous machines ï important design

consideration ï radial gap length ï stator slot ï stator coil ï rotor construction ï design of 3 phase synchronous machines.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Course in electrical machine design	A.K.Sawhney	Dhanrai Publishing Company

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1	Principles of Electrical Machine Design	S.K. Sen	Oxford & IBH publishing co.pvt. ltd., New Delhi
2	Principles of Electrical Machine Design	R.K.Agrawal	S.K.Kataria & Sons
3	Designs of Electrical Machines	Mittle.V.N	Standard Book House
4	Electrical Machine Design	A.Nagoor Kani	RBA Publications
5	Electrical Machine Design	C.Eshwarlal	Sonaversity
6	Performance and design of AC Machine	M.G.Say	CBS Publisher & Distributor

ELECTRICAL MACHINE DESIGN

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Mention 3 fundamental requirements for the good insulating material.

(2) List the limit of temperature raise of transformer winding, oil and core.

(3) State the four classes of ratings.

(b) (1) What are the important design and construction elements of a transformer? Discuss about them.

(2) Discuss in detail about magnetic materials used for machine design.

II. (a) (1) Why magnetic circuit in rotating machine is more complex than in transformer?

(2) Explain ñ gap expansion factorò.

(3) List the methods employed for the calculation of MMF required for tapered teeth.

(b) (1) Explain in detail about rotating machine leakage reactance.

(2) Discuss about magnetizing force for teeth.

III. (a) (1) Mention the factors on which the clearance between LV & HV coils depends.

(2) State the advantages of three phase transformer over three single phase transformers.

(3) List the functions of transformer oil.

(b) (1) Compute core and window area of 1MVA, three phase, 50Hz delta connected Distribution transformer.

$\square_{\square} = 1.55\ \square$; $\square = 2.75 \times 10^{6}\ \square/\square^{2}$; $\square_{\square\square} = 0.0018$; $\square_{\square} = 0.95$; $\square_{\square} = 0.35$

IV. (a) (1)Mention the design considerations for large dc motors.

(2) List the advantages of having large number of poles in dc machines.

(3) Mention the factors for designing the length of air gap in dc machine.

(b) (1) Arrive the power equation of dc generator and dc motor.

(2) Enumerate the advantages of large number of poles in dc machine.

V. (a) (1) Describe important features of modular construction of induction motor frame.

(2) State and explain the relationship between D & L for best power factor in three phase Induction motor.

(3) Mention the effects of short circuit ratio on the performance of Synchronous Machine.

(b) (1) Mention the important design considerations of three phase induction motor and Discuss about them.

(2) Determine approximate values for the stator bore and the effective core length of a 55kw, 415V, three phase, star connected, 50HZ four pole induction motor with efficiency= 90% ; power factor =0.91; winding factor= o.955. Assume suitable data wherever necessary.

ELECTRICAL MACHINE DESIGN

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Mention two points in favor of standardization.

(2) Define leakage coefficient.

(3) List the standard ratings for outdoor type distribution transformers as per the standard IS : 1180-1966 .

(b) (1) What are the important design and constriction elements of rotating machines? Discuss about them.

(2)Enumerate the component losses in a transformer and rotating machine.

II. (a) (1) What is air gap leakage?

(2) Explain gap

(3) Define ñapparent flux densityò and ñReal flux densityò.

(b) (1) Discuss about magnetizing force for teeth.

(2) Explain the detail about rotating machine leakage reactance.

III. (a) (1) Mention the functions of distribution, generator and transmission transformers.

(2) List the factors considered for designing the type of arrangement used for the Winding of transformers.

(3) Mention the methods of cooling for dry type transformer

(b) (1) Derive the power equation of 1phase core type transformer.

(2) Show that for minimum total I^2 loss in a transformer, current densities of primary And secondary should be approximately equal.

IV. (a) (1) What are the effects of thyristorized supply to dc machine?

(2) List the disadvantages of having larger number of poles in dc machines.

(3) Mention the guiding factors for selecting the number of poles in dc machine.

(b) (1) Draw the general flow chart for the design of dc machine and explain.

(2) What are the considerations to be taken into account in the choice of number and Dimensions of slots for a dc machine? Discuss about them.

V. (a) (1) Why is a short gap length so important to the operation of an induction motor?

(2) State the various losses in three phase induction motor.

(3) Define ñshort Circuit Ratioò in synchronous machine.

(b) (1) Derive the power equation of ac generator and motor.

(2) Mention the important design considerations of 3phase synchronous machines And discuss about them.

EEC550 - COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : **Diploma in Electrical and Electronics Engineering**

Course code : **1030**

Semester : **V**

Subject code : **EEC550**

Subject Title : **COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL**

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Name of Subject	Instruction		Examination		
		Hours / Week	Hours / Semester	Assessment marks		
				Internal	Autonomous Exam	Total
EEC550	Computer Aided Electrical Drawing Practical	3	45	25	75	100

RATIONALE

This subject is introduced in order to impart skill of making computer aided electrical drawing.

OBJECTIVES

On completion of this subject, the student must be able to draw

2D diagrams using Auto CAD

Symbols widely used in Electrical and Electronics circuits

Single line diagram of different types of panels.

Single line diagrams of substation layout.

Winding diagrams

Line diagram of distribution panel

DRAWING - ELECTRICAL SYMBOLS

1. Draw the symbols for machines : Armatures, Alternators, Field winding - Shunt, Series and Compound, Transformers, Auto Transformers
2. Draw the symbols for components :Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, Gates AND, OR, NOT, NAND, NOR, EXOR
3. Draw the symbols used in circuits : Relays, contactors, fuses, main switch, electric bell, earth, antenna, DPST, DPDT, TPST, Neutral link
4. Draw the symbols for instruments : Ammeter, Voltmeter, Wattmeter, Energy meter, Frequency meter, Power factor meter, Timers, Buzzers

DRAWING - ELECTRICAL CONNECTION DIAGRAMS

5. A) Draw the panel wiring diagram of two shunt generators in parallel.
   B) Draw the panel wiring diagram of two single phase alternators in parallel.
6. A) Draw the winding diagram of lap connected DC armature with commutator connections and brush positions.
   B) Draw the winding diagram of wave connected DC armature with commutator connections and brush positions.
7. A) Draw the mesh winding diagram of a three phase induction motor.
   B) Draw the concentric winding diagram of a single phase induction motor.
8. Draw the control circuit of jogging.
9. Draw the control circuit of automatic rotor resistance starters.
10. Draw the connection diagram of ON load tap changer.
11. Draw the circuit of three phase transformers in parallel.
12. Draw the connections of three point starter.
13. A) Draw the connections of automatic star - delta starter.
    B) Draw the connections of direct on line starter.
14. Draw the single line diagram of 110 KV / 11 KV receiving substation.

NOTE FOR EXAMINERS

1. Five symbols should be asked from part A exercise 1to 4 with at least one from each.
2. One sketch should be asked from part B exercise 5 to 14.
3. Printed output of the given symbols and sketch is to be evaluated

LIST OF EQUIPMENTS

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

QUESTION PATTERN

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1.	Symbols In CAD	10
2.	Manual Drawing Of Electrical Connection Diagram	10
3.	Electrical Connection Diagram In CAD	40
4.	Print Out	10
5.	Viva Voce	05
	Total	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC560

Subject Title : MICROCONTROLLER AND EMBEDDED SYSTEM PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC560	Microcontroller And Embedded System Practical	6	90	25	75	100

RATIONALE

- To provide hands on experience in handling electronic equipments to the diploma students and to make them realize the theoretical concepts studied, practical subjects are introduced corresponding to every theory subject.

- This practical supports the aim and objective of Microcontroller and Embedded System subjects.

OBJECTIVE

- To write and execute assembly language program using 8051
- To interface 8051 with keyboard, LED, ADC, traffic light controller etc
- To use ARM processer kit for execution of Assembly language program

LIST OF EXPERIMENTS

EEC560 - MICROCONTROLLER and EMBEDDED SYSTEM PRACTICAL

Note 1: All the experiments should be conducted

2: Different data are to be given for each batch

Part-A

Assembly language program using 8051

1. Write an Assembly Language Program for Multi-byte Addition and execute the same in the 8051 Kit.
2. Write an Assembly Language Program for Multiplication and Division of two numbers and execute the same in the 8051 Kit.
3. Write an Assembly Language Program for arranging the given data in Ascending order and execute the same in the 8051 Kit.
4. Write an Assembly Language Program for ASCII to Binary and execute the same in the 8051 Kit.
5. Write an Assembly Language Program for Parity bit generation and execute the same in the 8051 Kit.

6 Write an Assembly Language Program for using timer / Counter and execute the same in the 8051 Kit.

Part – B

INTERFACING WITH APPLICATION BOARDS

7. Write an Assembly Language Program for interfacing Digital I/O board and test it.
8. Write an Assembly Language Program for interfacing Matrix keyboard and test it.
9. Write an Assembly Language Program for interfacing seven segment LED displays and test it.
10. Write an Assembly Language Program for interfacing Traffic light control and test it.
11. Write an Assembly Language Program for interfacing 8 bit ADC and test it.
12. Write an Assembly Language Program for interfacing STEPPER MOTOR and test it.
13. Write an Assembly Language Program for interfacing DC motor and test it.
14. Write an Assembly Language Program for Sending data through serial port between controller kits and test it

Part – C

Using ARM processor

15. Write Simple Assembly Programs using ARM processor kit for
    a. Addition b. Subtraction c. Multiplication d. Division
16. Write Programs using ARM processor for
    a. 8 Bit Digital Output -LED Interface
    b. 8 Bit Digital Inputs (Switch Interface)

EQUIPMENTS REQUIRED

S.No	Name of the Equipments	Required Nos
1.	8051 Microcontroller Kit	18 Nos
2.	Digital I/O Interface Board	02 Nos
3.	Matrix keyboard Interface Board	02 Nos
4.	Seven segment LED display Interface Board	02 Nos
5.	Traffic light Interface Board	02 Nos
6.	8 bit ADC Interface Board	02 Nos
7.	8 bit DAC Interface Board	02 Nos
8.	STEPPER MOTOR CONTROL Interface Board	02 Nos
9.	DC motor control Interface Board	02 Nos
10.	Sending data through serial port between controller kits	02 Nos
11.	Arm Processor Kit	02 Nos

QUESTION PATTERN

S.No	NAME OF THE ACTIVITY	MARK ALLOCATION
1.	Program	30
2.	Execution	30
3.	Result	10
4.	Viva Voce	05
	TOTAL	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC571

Subject Title : CONTROL OF ELECTRICAL MACHINES

PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC571	Control of Electrical Machines Practical	6	90	25	75	100

RATIONALE

- To provide hands on experience to the diploma students, in handling and controlling electrical machines this practical subject is introduced.
- This practical supports the aim and objective of Control of Electrical Machines Theory subject.

OBJECTIVE

- To connect hard wired control circuit and control electric motor.
- To program PLC to control electrical appliances and execute controlling action.

LIST OF EXPERIMENTS

EEC571 - CONTROL OF ELECTRICAL MACHINES PRACTICAL

1. a) Perform breakdown test and determine the dielectric strength of transformer oil.
   b) Conduct acidity test on transformer oil.
2. Test the timing characteristics of thermal over load relay.
3. Wire and test the control circuit for jogging in cage induction motor.
4. Wire and test the control circuit for semi-automatic star ï delta starter.
5. Wire and test the control circuit for automatic star ï delta starter.
6. Wire and test the control circuit for dynamic braking of cage motor.
7. Wire and test the control circuit for two speed pole changing motor.
8. Wire and test the control circuit for forward and reverse operation.
9. Wire and test the control circuit for automatic rotor resistance starter.
10. Test the working of single phase preventer.
11. Wire and test the DOL starter with single phase preventer using PLC.
12. Wire and test the Star ï Delta starter using PLC.
13. Wire and test the control circuit for automatic rotor resistance starter using PLC.
14. Develop & execute the ladder logic diagram in PLC for 3 stage lift operation.
15. Wire and test the sequential operation of solenoid valve and a motor for tank filling operation using PLC.
16. Develop and execute the ladder logic to interface PLC with conveyor model for counting the object moving in the conveyer.

****The performance of control circuit is to be verified with Induction motor for the experiments 3 to 13**

S. No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	Transformer oil Tester Kit, Acidity test kit	Each 1
2	Thermal Overload Relay	3
3	AC contactor 230v/440v, 16A	26
4	Push Button With NO/NC Elements	30
5	Induction motor 440 V, 1440 rpm, any HP rating (apart from EM-II lab)	3
6	Proximity switch	2
7	PLC (any brand) suitable for above experiments	5
8	Solenoid valve	2
9.	Three stage lift model, conveyor model	Each 1

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Drawing Connection/Ladder Diagram and Writing Details of the Components/Equipments/Machines used	15
2.	Making the correct circuit connections	15
3.	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	25
4.	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	15
5.	Viva-voce	05
	Total Marks	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC572

Subject Title : PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC572	Programmable Logic Controller Practical	6	90	25	75	100

RATIONALE

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

OBJECTIVES:

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

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

EEC572 - PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

LIST OF EXPERIMENTS

(1) DOL Starter with single phasing prevention

(2) Changeover switch implementation with interlocking

(3) Star Delta starter

- single phasing prevention
- Adjustable star-delta transfer time
- Pre-settable Overload trip time

(4) Automatic Load transfer

- transfers load from one phase to another when one phase in a 3 ph. system fails
- automatically restores when power is resumed
- time delays are effected to prevent action during short time failure

(5) Industrial sliding door automation

- Sequencing
- Open ¼ th Full width
- Wait for next go command
- Next open full
- wait for a time and close full

(6) Fire Alarm

- Multiple alarms
- sound alarm 1
- if not acknowledged, sound alarms 1 and 2
- similarly go up to 4 alarms

(7) Conveyor Belt sorting

- storing to left bin
- storing to right bin
- storing to exit bin

(8) Three floor Hoist controller

- Sequencing
- floor level detection
- Gate safety latch

(9) Burglar scare random lighting in building with variable timing

- The lights in each room are switched on at pre-determined intervals and switched off at pre-determined time. The lighting is shifted from area to area randomly to scare the burglars with a false fear of presence of people.

(10) Analog input to PLC as a set of value for a comparator function block

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

(11) Round Table - Liquid filling System

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

(12) Sequential timer for educational institute

Timings are alterable by supervisor while program is running. Pre-and-post ï Holiday sequence selectable

(13) Slow speed motor control using PWM function of the PLC

- Slow speed 12V DC 18W Permanent Magnet Motor with a fly wheel is controlled with the PWM output and a feedback from a low resolution encoder

(14) Man-machine interface lay-out and annunciation functions

LIST OF EQUIPMENTS

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1	PLC suitable to conduct above experiments	3
2	Limit switch	1
3	Reed switch	1
4	Inductive proximity sensor	1
5	Capacitive proximity sensor	1
6	PC laptop	3

QUESTION PATTERN

S.No	NAME OF ACTIVITY	MARK ALLOCATION
1.	Drawing Connection/Ladder Diagram and Writing Details of the Components/Equipments/Machines used	15
2.	Making the correct circuit connections	15
3.	Conducting the Experiment - Following the correct procedure - Verifying the operation / appropriate readings - Following the appropriate safety procedure	25
4.	Tabulation of Readings / Interpretation of Results Graphical Representation (If required)	15
5.	Viva-voce	05
	Total Marks	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : V

Subject code : EEC573

Subject Title : ELECTRICAL MACHINE DESIGN PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC573	Electrical Machine Design Practical	6	90	25	75	100

RATIONALE

To provide hands on experience to the diploma students, in designing electrical machines and to support the aim and objective of Electrical Machine design Subject, this practical is introduced.

OBJECTIVE

To design and wind the coil of electrical machines like transformer, armature and field winding of dc machines, induction machines and synchronous machines.

LIST OF EXPERIMENTS

EEC573 - ELECTRICAL MACHINE DESIGN PRACTICAL

1. By simple experiment, verify the magnetic laws using Coil, permanent magnet and Galvanometer.

2. Verify the rotating magnetic field with stator and ball.

3. Measure magnetic flux using flux meter.

4. Using Crawler test the windings.

5. Design a 1 phase 1 KVA ,230/15V core type transformer and assemble the core.

6. Design a 1 phase 1KVA, 230/15V shell type transformer and assemble the core.

7. Design 3 phase 1 KVA transformer and assemble winding, core, etc.,

8. Design 3 phase 1 KVA transformer (delta/star connected) and wind one coil set.

9. Design armature for 5 KWdc machine and insert one coil set.

10. Design field pole for 5 KWdc machine and assemble one pole and insert in the body.

11. Assemble the given dc machine (pole, inter pole, armature, commutator, brush etc).

12. Design and assemble ceiling fan.

13. Design and assemble a 3 HP induction motor.

14. Design and assembled 3phase 3HP synchronous motor.

15. Dismantle and assemble a 3 phase wound rotor induction motor.

16. Design and assembled 1phasesalient pole 5KVA alternator.

Allocation of Marks

For exercises requiring circuit diagram and connection

1. Circuit Diagram	-	20marks
2. Connection	-	20marks
3. Readings Taken & Tabulation	-	10marks
4. Calculation & Result and Graph if any	-	20marks
5. Viva	-	5marks
Total	-	75marks

For other exercises

1. Design Particulars / Theory behind exercises	-	30marks
2. work menship & finishing / carrying of the test & finding the result	-	40marks
3. Viva	-	5marks

List of Equipments Required

1. Permanent Magnets	-	2 Nos
2. Galvanometers	-	2Nos
3. Flux meter	-	1No
4. Growler	-	1No
5. 3Phase induction motor stator with winding	-	1No
6.1KVA Single phase 230/15 loading Transformer	-	1No
7. 1KVA 3 phase Transformers	-	3Nos
(or)		
E & I type stampings for 1KVA Transformer	-	12Kg
Primary Coils & Secondary Coils for 1KVA Transformer	-	9Nos
8. 5KW DC armature without winding	-	1No
9. 5KW DC machine with inter poles	-	2Nos

10. Stator with winding, rotor and end covers with bearing of a 3HP cage induction motor - 2sets

11. 5KVA Single phase alternator - 1No

12. 3phase 3HP wound rotor induction motor - 2Nos

13. Celling Fans - 2Nos

14. Motor coil winding machines - 2Nos

VI SEMESTER

EEC610 – DISTRIBUTION AND UTILIZATION

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC610

Subject Title : DISTRIBUTION AND UTILIZATION

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC610	DISTRIBUTION AND UTILIZATION	**6**	**90**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
I	Distribution	**17**
II	Industrial Drives	**17**
III	Electric Traction	**17**
IV	Illumination	**17**
V	Electric Heating and Welding	**17**
	Revision, Test	**5**
	Total	**90**

RATIONALE

Distribution system is the part of power system which distributes power to the consumers for utilization. To have adequate knowledge in distribution and utilization of Electrical energy, it becomes necessary to include this subject.

OBJECTIVES

To Understand

- Substation arrangements
- Distribution -classification and scheme of connection
- Drives-Suitability for different applications
- Track Electrification-Traction mechanics
- Traction motors and control
- Illumination -Design of lighting scheme-sources of light
- Electric Heating- Different methods.
- Electric furnaces and Temperature control
- Electric welding and welding equipments.

DETAILED SYLLABUS

Unit I Distribution

Substation:

Introduction-Sub stations-classification of sub stations-Indoor and outdoor S.S - Gas insulated S.S ï comparisons - Layout 110/11KV Substation and 11KV/400V D distribution Substation- substation equipments ï Bus bar - Types of bus bar arrangement -Advantages and Disadvantages.

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 ï Types - connection schemes of Distribution system - A.C Distribution calculations - Calculation of voltage at load points on single phase distribution systems (With concentrated load only)- Distribution fed at one end, both ends and ring mains ï problems - Three phase, four wire, Star connected unbalanced load circuit ï Problems - consequence of Disconnection of Neutral in three phase four wire system (illustration with an example).

Unit II Industrial Drives

Introduction - Electric drive ï 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 - 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 ï Braking - Features of good braking system - Types of Braking - Advantages of Electric braking - Plugging, Dynamic and Regenerative braking - As applied to various motors.

Unit III Electric Traction

Introduction - 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 ï Necessity - Methods of connecting B.T - Neutral sectioning.

Traction Mechanics:

Units and notations used in Traction mechanics - Speed time curve for different services - simplified speed time curve - Derivation of maximum speed - crest speed, Average speed, Schedule speed (definitions only) - Tractive effort and power requirement - Specific energy output - specific energy consumption.

Traction motors and control:

Desirable characteristics of Traction motors - Motors used for Traction purpose - Methods of starting and speed control of D.C Traction motors - Rheostatic Control - energy saving with plain rheostatic control - series-parallel control - Energy saving with series parallel starting - Shunt Transition - Bridge-Transition - Drum control - contactor type bridge Transition controller - Metadyne control-multiple unit control - Regenerative braking.

Recent trends in Electric Traction-Magnetic Levitation (MEGLEV)- Suspension systems.

UNIT – IV Illumination

Introduction - Definition and units of different terms used in illumination - Plane Angle, Solids angle, Light, Luminous flux, Luminous Intensity, Luminous Efficacy candle power, Lumen, Illumination, M.S.C.P, M.H.C.P, M.H.S.C.P - Reduction factor, Luminance, Glare Lamp efficiency. Space-height ratio, Depreciation factor, Utilization factor, waste light factor, Absorption factor, Beam factor, Reflection factor - Requirements of good lighting system - Laws of Illumination - problems. Types of lighting scheme - Factors to be considered while designing lighting scheme - Design of lighting

Scheme (Indoor and outdoor)- Problems - Lighting systems - Factory lighting, Flood lighting, Street lighting.

Sources of light- Arc lamp, Incandescent lamp, Halogen Lamp, Sodium vapour lamp, High pressure mercury vapour lamp, Fluorescent Tube - Stroboscopic Effect - Energy saving lamps (C.F.L and L.E.D lamps)- - Energy saving consideration for fluorescent lamp.

Unit V Electric Heating and Welding

Electric Heating

Introduction - Advantages of Electric heating - modes of heat transfer - classification of Electric Heating - Power frequency electric heating - Direct and Indirect resistance heating - Infrared heating - Arc heating ï High frequency Electric heating - Induction heating ï Eddy current heating and Dielectric heating.

Electric furnaces:

Resistance furnace -Requirements of Heating elements - commonly used heating element materials - Resistance furnace for special purposes - Temperature control of resistance furnace - Arc furnace -Direct and Indirect Arc furnace- Temperature control of Arc furnace - Reasons for employing low voltage and high current supply - Induction furnace - Direct and Indirect core type Induction furnace - coreless Induction furnace - Power supply for coreless Induction furnace.

Electric welding:

Introduction - Types of Electric welding - Requirements of good weld - Preparation of work - Resistance welding - Butt welding, Spot welding, Seam welding, Projection welding and Flash welding - Arc welding - Carbon Arc welding, Metal Arc welding, Atomic hydrogen Arc welding, Inert gas metal

arc welding -Comparison between Resistance and Arc welding. Radiation welding - Ultrasonic welding, Electron beam welding, LASER beam welding - Electric welding equipments (A.C. and D.C).

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Course in electrical Power	JB.Gupta	Katson Publishing House, New Delhi

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Electric Power	S.L.Uppal	Khanna Publisher, New Delhi
2.	A Text Book In Electric Power	1.Soni 2.Gupta 3.Bhatnagar	Dhanpat Rai & Sons, Delhi
3.	Modern Electric Traction	H. Partab	Dhanpat Rai & Sons, Delhi
4.	Electrical Power Distribution System	A.S.Pabla	Tata McGraw Hill Publishing Co., New Delhi
5.	Fundamentals of Electrical Drive	G.K. Dubey	Narosa Publishing House, New Delhi
6.	Utilization Of Electric Power	N.V.Suryanarayana	Tata McGraw Hill Publishing Co., New Delhi
7.	Electric Drives	Vedam Subramaniam	New age International, New Delhi
8.	Industrial Drives and Controls	TTTI, Chennai	Tata McGraw Hill Publishing Co., New Delhi

DISTRIBUTION AND UTILIZATION

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Explain the advantage of Interconnected system with a neat a sketch.

(2) List the factors to be considered for selection of a site for a sub-station.

(3) List the different types of Bus bar arrangement used in sub Stations.

(b) (1) A single-phase AC Distributor AB 300 meters long is fed from end A and is loaded as follows;-

200A at 0.8 PF lagging 2oom from point A.

100A at 0.707 PF lagging 300M from point A.

The total resistance and reactance of the distributor is 0,2 ohms and 0.1ohms/kilometer. Calculate the total voltage drop in the distributor if load power factors are reoffered at the far end.

(2) Explain the functions of different equipments used in substation.

II. (a) (1) List the advantages of a group drive.

(2) Explain the principle of rheostat braking

(3) Explain the advantages of electrical breaking.

(b) (1) state the factors to be considered, while choosing a motor for specific application.

(2) Explain the regenerative breaking as applied to DC and AC motors.

III. (a) (1) state the advantages of 25KV.50 HZ, AC system for track electrification.

(2) List the factors affecting energy consumption in traction.

(3) Justify the suitability of D.C series motor for traction service.

(b) (1) Draw and explain the speed-time curve for electric traction.

(2) Derive the expression for tractive effort for propulsion of train.

IV. (a) (1) list requirements of good breaking system.

(2) Two lamps L1 and L2 of candle power 300 and 500 respectively are situated 100 meters apart. The height of L1 above the ground level is 15 meters and that of L2 is 10 meters. Calculate the illumination. At the centre of line joining lamp posts at the ground.

(3) Explain the stroboscopic effect in fluorescent tube.

(b) (1) State and explain laws of illumination.

(2) Explain with neat sketch, bridge transition during series parallel control of traction motors.

V. (a) (1) classify different methods of electric heating.

(2) Explain the working of Direct Arc Furnace.

(3) List the requirements of good welding.

(b) (1) Explain the process of submerged arc welding and its applications.

(2) Explain the principle, advantages and disadvantages of dielectric

DISTRIBUTION AND UTILIZATION

MODEL QUESTION PAPER -II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I a) (1) Differenciate between feeder, distributor and service mains

(2) Classify the subsations on the basis of service and design

(3) Breifly explain ring bus-bar with simple sketch

b) (1) Explain the consequence of disconnection of the neutral in a 3 phase AC distribution system.

(2) Explain the various types of double bus-bar arrangement with Diagram. Write its advantages and disadvantages

II. a) (1) Compare group drive and individual drive.

(2) Write notes on ball and roller bearings used in industrial drive.

(3) Enumerate the advantages and disadvantages of electrical braking while compairing with mechanical breaking

b) (1) State with reasons the motor used for the following applications

(i) Cement mill

(ii) Rolling mill

(iii) Paper mill

(2) Explain the various methods of speed control in induction motor

III. a) (1) What is the necessity of neutral sectioning in 25KV traction system

(2) Explain the function of catenery and droppers.

(3) With simple figure write notes on booster transformer with return feeder

b) (1) Derive the relationship of speed and time using trapezoidal curve

(2) Write notes on linear induction motor and their advantages and disadvantages

IV a) (1) Define i) Illumination

ii) Space height ratio

iii) Depreciation factor

(2) What are the requirement of good braking system?

(3) Write detailed notes on ñArc Lampò

b) (1) State the two laws of illumination and prove them.

(2) Explain with sketch:

i) Multi-unit control

ii) metadyne control

iii) Thyristor control

V. a) (1) List the advantages of electric heating.

(2) Name the two types of electrical welding and list their

Classification in each type

(3) Discuss the different electrodes used for arc welding. State their

Field of application

b) (1) With the relevant figure explain the construction and operation of

direct and indirect resistance heating

(2) With the neat diagram explain the construction and working of
Electron beam welding and list the merits and demerits.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC620

Subject Title : Operation and Maintenance of Electrical Equipment

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC620	Operation and Maintenance of Electrical Equipment	**5**	**75**	**25**	**75**	**100**

TOPICS AND ALLOCATION OF HOURS

Unit	Topic	Time (Hrs)
I	Earthing Arrangements, Safe Working Of Electrical Equipment, Building Electrical Installations	14
II	Operation & Maintenance Of Transformer	14
III	Operation & Maintenance Of Generators, Sub-Stations And Circuit Breakers	14
IV	Operation & Maintenance Ac Motors And Starters	14
V	Operation & Maintenance Of Lighting, Transmission And Distribution	14
	Revision And Tests	5
	Total	**75**

RATIONALE

In Power Generation, Transmission and Distribution Systems, various electrical equipment are being used such as generators, transformers, motors, circuit breakers and so on. Therefore, it is must for an Electrical Engineer to learn the various activities concerning operation and maintenance of electrical equipment.

OBJECTIVE

- Understand electrical installation and electrical safety.
- Understand operation and maintenance of transformer.
- Understand operation and maintenance of Generators, substations and circuit breakers.
- Understand operation and maintenance of AC motors and Starters.
- Understand operation and maintenance of Lighting transmission and distributions.

DETAILED SYLLABUS

EEC620 OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT

UNIT – I : EARTHING ARRANGEMENTS, SAFE WORKING ON ELECTRICAL EQUIPMENT, BUILDING ELECTRICAL INSTALLATIONS:

Earthing Arrangements:

Points to be earthed - Earthing Procedure - Earth resistance measurement - Action to be taken to reduce earthing resistance - Earth Leakage Protection (ELCB).

Safe Working on Electrical Equipment:

Authorized Person - Procedure for Shutdown - Testing device for Electricity - Special shutdown precautions in substations and Power House.

Building Electrical Installations:

Points to be inspected - Insulation Resistance Measurement Procedure - Points to be checked in switches and fuses - Points to be inspected in Potable equipment - Action to be taken if an electrical equipment catches fire - Different types of Fire extinguishers & its applications.

UNIT – II : OPERATION & MAINTENANCE OF TRANSFORMER

Forces generated in transformer during short circuit - Noise in operation ï Reason for temperature rise ï insulation resistance - Drying out - precaution for paralleling transformer-inrush current and remedy - insulation co-ordination - effect on insulation during star point earthing ï transformer maintenance schedule ï action to be taken while transformer oil temperature rises unduly ï points to be checked by oil level tends to fall down ï attention required for bushing and insulator.

UNIT – III : OPERATION & MAINTENANCE OF GENERATORS, SUBSTATIONS AND CIRCUIT BREAKER

Generators:

Parallel operation of Alternators - Real power and Reactive power adjustment between alternators running in parallel - AVR role - Causes for Alternator fails to build up - Instability in Alternator - Cyclic speed irregularity - Protective & Indicative equipments for Alternator - Causes for overheating of armature & field winding of Alternators - Causes for circulating current between Alternators running in parallel - Causes for pitting of Alternator bearings - Reverse current protection & its necessity,

Sub-stations and Circuit Breaker :

Difference between Isolator & Circuit breaker - Rupturing capacity of Circuit breaker - Short-circuit calculations - Conditions can a circuit breaker arranged to trip - Auto reclose breaker - fault clearance time - Inverse time overload relay - Procedure to ensure proper operation of Circuit breaker in the event of a fault - Maintenance requirement for Oil Circuit Breakers - Attention required for the contacts of Contactors - Maintenance requirement of SF6 Circuit breakers.

UNIT – IV : OPERATION & MAINTENANCE 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.

UNIT –V : OPERATION & MAINTENANCE OF LIGHTING, TRANSMISSION AND DISTRIBUTION

LIGHTING

Glare reduction - Stroboscopic Effect and methods to reduce - Steps in Designing Lighting installation - Trouble shooting in Fluorescent Lamp and Discharge Lighting - Street Light Control methods - Fluorescent Lamp Disposal - precautions in Erecting Lighting Installations - Symptoms to identify the end of the useful life of Lamp - Causes for lowering of Illumination level

Transmission and Distribution :

Permissible limit for variation of voltage/frequency as per IS Standard, Factor of Safety - safety devices for overhead Transmission lines - Minimum clearance of between conductors & building - Advantages & Limitations of Steel Cored Aluminium Conductors (ACSR) - Purpose of continuous earth wire - Points to be checked when carrying out inspection in overhead transmission line -Prevent rusting of Steel post - Protection requirements for

Transmission line - Insulation level & Co-ordination - Precautions in erecting UG Cable - Causes for failure of UG Cable - Cable fault locations - Fall of potential method - Murray loop test method - Locating cable discontinuity

Text book:

Sl.No	Name of the Book	Author	Publisher	Edition
1	Operation and Maintenance of Electrical Equipment – Volume I & II	B.V.S.Rao	Media Promoters & Publishers Private Limited, Mumbai	1st Edition, 1st Reprint 2011

Reference Book

Sl.No	Name of the Book	Author	Publisher	Edition
1	Testing, Commissioning, Operation and Maintenance of Electrical Equipments	S.Rao	Khanna Publishers, New Delhi	Sixth Edition, 2010

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC631

Subject Title : POWER ELECTRONICS AND DRIVES

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC631	Power Electronics And Drives	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (Hrs)
I	Thyristor Family, Trigger and Commutation Circuits	14
II	Phase Controlled Rectifier	14
III	Choppers and Inverters	14
IV	Control of DC Drives	14
V	Control of AC Drives	14
	Revision, Test	5
	Total	75

RATIONALE:

Developments in Electronics have their own impact in other fields of Engineering. Today all the controls and drives for the electrical machines are formed by electronic components and there are many electronic devices available to handle electric power in terms Kilo-Amps and Kilo-Volts. This subject gives a comprehensive knowledge base about the devices and circuits used in electrical power control.

OBJECTIVES:

To Understand

- Characteristics of Thyristor family.
- SCR trigger circuits.
- Working of trigger circuits.
- Commutation circuits.
- Operation of commutation circuits.
- Applications of trigger and commutation circuits.
- Phase controlled rectifier
- Applications of the phase controlled rectifier
- Working of half wave controlled rectifier circuit with R and R L load
- Single phase Semi converter Bridge and single phase full Converter Bridge for RL load.
- Operation of single phase and three phase full converter with RL load
- Protection of converter circuits
- Choppers and inverters
- Applications of choppers and inverters
- Various types of choppers with circuit diagram
- Various methods of inverters with circuit diagram
- Control of DC Drives
- Various methods of speed control of DC drives
- Types of power factor improvement in phase controlled converter
- Closed loop control of DC drives
- Control of AC drives
- Torque - speed characteristics of three phase induction motor
- Speed control of three phase induction motor
- Closed loop control of AC drive
- Operation of single phase and three phase cyclo converter

DETAILED SYLLABUS

EEC631 - POWER ELECTRONICS AND DRIVES

Unit I Thyristor Family, Trigger and Commutation Circuits

Thyristor family ï (Review) SCR-symbol, working , characteristic, holding current, latching current, dv/dt, di/dt ratings, gate protection- Insulated gate bipolar transistor (IGBT) ï MOSFET - Symbol, working and characteristics of DIAC, TRIAC, SUS, SCS, SBS, LASCR,and GTOï symbol, working and characteristics- specifications of the above power devices

Gate trigger circuits ï DC triggering, AC triggering, pulse gate triggering- Pulse transformer in trigger circuit ï Electrical isolation by opto isolator ï Resistance firing circuit and waveform ï Resistance capacitor firing circuit and waveform, Synchronized UJT triggering (ramp triggering) ï Ramp and pedestal trigger circuit for ac load.

Commutation circuits ï SCR turn off methods ï Natural commutation ï Forced commutation- Class A, Class B, Class C, Class D, Class E and Class F- Explanation with wave forms.

Unit II Phase Controlled Rectifier

Introduction - applications of phase controlled rectifier -classification of rectifier ï half wave controlled rectifier with resistive load, RL load, effect of freewheeling diode ï single phase half controlled bridge with RL load (semi converter) ï average DC output voltage ï waveform ï input power factor (definition and expression) ï single phase fully controlled bridge with RL load (full converter) ï average DC output voltage ï waveform ï input power factor (definition and expression) ï effect of single phase fully controlled bridge with source impedance for RL load ï wave form ï working.

Three phase fully controlled bridge with RL load ï firing sequence ï average DC output voltage and current waveform ï three phase half controlled bridge with RL load- average DC output voltage ï waveform.

Complete protection of converter ï against surge current, surge voltage, dv/dt and di/dt protection.

Unit III Choppers and Inverters

a) Choppers - Introduction ï applications ï principle of chopper ï control strategies (time ratio and current limit control) ï types of chopper ï type A, B, C, D, and E ï step up chopper ï Jones chopper ï Morgan chopper ï Chopper using MOSFET ï PWM Control circuit for driving MOSFET in chopper.

b) Inverters - Introduction ï applications ï inverter classifications ï single phase series inverter ï basic parallel inverter , voltage and current waveform ï single phase full bridge inverter ï single phase inverter output voltage control ï types ï single pulse width modulation ï multiple pulse width modulation ï sinusoidal pulse width modulation ï basic three phase bridge inverter with 120 degree conduction mode ï circuit, trigger sequence, waveform and working ï parallel inverter using MOSFET and IGBT ï SMPS ï Buck, Boost, Fly back converter ï Control circuit for SMPS ï UPS ï working of UPS ï on-line and off-line UPS.

Unit IV Control of DC Drives

Introduction ï History of DC drive - applications ï basic dc motor speed equation ï operating region of armature voltage control and field current control ï constant torque and constant hp regions ï schemes for separately excited dc motor speed control ï single phase full converter drives - circuit, operating quadrants, waveform ï power factor improvement in phase controlled converter ï phase angle control, semi converter operation of full converter, asymmetrical firing ï three phase full converter drives ï operation and waveform ï chopper fed dc series motor drive. - Four quadrant DC ï DC converter drive using MOSFET and IGBT ï circuit and operation

Closed loop control of dc drives ï basic block diagram ï Phase locked loop (PLL) control of dc drives ï block diagram ï microprocessor based closed loop control of dc drive ï block diagram and working

Unit V Control of AC Drives

Introduction ï applications ï torque speed characteristics of three phase induction motor ï speed control of induction motor ï stator voltage control, variable frequency control ï necessity of maintaining v/f ratio constant ï rotor resistance control ï inverters for variable voltage and frequency control ï speed control by rotor resistance for slip ring motors ï static scherbius drive (slip power recovery scheme) ï closed loop control of AC drive ï block diagram ï microcomputer based pulse width modulation control of induction motor drive.

Cycloconverter - introduction ï single phase to single phase cycloconverter ï input, output waveform with resistive load ï single phase bridge type cycloconverter ï three phases to three phase cycloconverter ï schematic diagram, basic circuit and working.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	PowerElectronics	MDSingh KBKhanchandaniata	McGrawHillPublishingCompany NewDelhi .

Reference Books:

Sl.No.	Name of the Book	Author	Publisher
1	Power Electronics- Converter Applications And Design	Mohan Underland Robbins	John Wiley and Sons , NewYork
2	Fundamentals of Electrical Drives	G K Dubey	Narosa Publishing House, New Delhi
3	Fundamentals of Power Electronics	SRamaReddy,	NarosaublishingHouse,NewDelhi,
4	Power Electronics	Dr P S Bimhra	Khanna Publishers
5	Power Electronics	P C Sen	Tata McGraw Hill Publishing Company New Delhi
6	Power Electronics	MUHAMMED H.RASHID	Prentice-Hall of India Pvt. Ltd New Delhi-110001.

POWER ELECTRONICS AND DRIVES

MODEL QUESTION PAPER -I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I a) 1) Briefly explain the characteristics of light activated SCR.
2) Explain working and characteristics of DIAC
3) Explain working and characteristics of TRIAC

b) 1) with a neat circuit diagram explain the characteristics of IGBT.
2) With a neat circuit diagram explain the working of synchronized UJT triggering circuit. Draw the necessary waveforms.

II a) 1) Draw the circuit diagram and waveform for half wave controlled rectifier with R load.
2) Explain di/dt protection employed for SCR
3) What is the use of freewheeling diode

b) 1) With a neat circuit diagram and waveform explain the operation of three phase half controlled bridge with RL load.
2) Draw the complete protection circuit for the single phase converter and Explain in detail, how surge current and voltage protection are Implemented.

III) a) 1) Explain briefly the working of class B chopper with a neat diagram
2) Explain the working of Morgan chopper
3) Write notes on sinusoidal PWM

b) 1) With a neat diagram, explain the working of Jones chopper
2) Draw a neat circuit diagram and explain the operation of single phase full bridge inverter.

IV) a) 1) Write a short note on semi converter.

2) Write short notes on phase locked loop.

3) Explain how power factor improvement is done in phase controlled converter

b) 1) Draw and explain the function of each block of closed loop control of DC motor drive and draw the waveform

2) With a neat diagram and explain the three phase full converter DC motor drive and draw the waveform

V) a) 1)Explain rotor resistance control of AC motor

2) Explain, Why v/f ratio has to be kept constant

3) Explain about static scherbius drive

b) 1) with a suitable block diagram explain the operation of single quadrant closed loop speed control of AC drive.

2) Draw a neat circuit diagram of single phase bridge type cycloconverter; Explain the working with necessary waveform.

POWER ELECTRONICS AND DRIVES

MODEL QUESTION PAPER -II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I) a) 1) Briefly explain the RC firing circuit

2) Explain the working and characteristics of IGBT.

3) Explain the process of commutation

b) 1) Draw a neat circuit diagram and explain the characteristics of GTO.

2) With a neat circuit diagram, explain the working of ramp and pedestal trigger circuit for AC load. Also draw the waveform.

II) a) 1) Why regeneration is not possible with semi converter?

2) Explain dv/dt protection employed for SCR.

3) What are the different types of inverters?

b) 1) with a neat circuit diagram and waveform explain the operation of single phase fully controlled bridge with RL load.

2) With a neat circuit diagram explain the effect of single phase half controlled bridge with RL load, and derive the expression for average DC output voltage.

III) a) 1) Explain briefly the step up chopper.

2) Explain Current limit control

3) Explain ñBuck converterò

b) 1) with a neat diagram, explain the working of Morgan chopper.

2) With a neat circuit diagram and explain the operation of three phase bridge inverter with 120 degree conduction mode.

IV a) 1) Draw and explain the operating regions of armature voltage control and field current control methods.

2) Explain the term ñfour quadrant controlò

3) Write short notes on speed control of DC motor

b) 1) Explain the operation of four quadrant DC-DC converter drive using MOSFET. Also draw a neat circuit diagram.

2) With a neat block diagram explain the microprocessor based closed loop control of DC drive.

V a) 1) Explain the speed control of induction motor using stator voltage control

2) State any four applications of AC drive

3) Explain micro computer based PWM of Induction motor drive

b) 1) with a neat diagram explain the working of static scherbius drive for slip ring induction motor.

2) Draw a neat circuit diagram of single phase to single phase cycloconverter. Explain the working with necessary waveform

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC632

Subject Title : BIO MEDICAL INSTRUMENTATION

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC632	Bio Medical Instrumentation	**5**	**75**	**25**	**75**	**100**

Topics and Allocation

UNIT	TOPIC	TIME (HRS.)
I	Physiological & Clinical Measurement	**14**
II	Bio ï Medical Records	**14**
III	Therapeutic Instruments	**14**
IV	Bio ï Telemetry And Patient Safety	**14**
V	Modern Imaging Techniques	**14**
	Revision, Test	**5**
	Total	**75**

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. This subject will enable the students to learn the basic principles of different instruments/equipment used in the health care industry.

OBJECTIVES

To understand

- Generation of Bio potential and its measurement using various Electrodes.
- Measurement of Blood pressure.
- Measurement of Respiration rate
- Principle of operation of ECG recorders
- Principle of operation of EEG & EMG records
- Working principle of Audio meter.
- Principle of operation of pacemakers.
- Basic principle of Dialysis.
- Principle of operation of Endoscopy.
- Working principle of telemetry.
- Basic principle of Telemedicine.
- Basic principle various types of lasers.
- Basic principle of CT Scanners.
- Principle of operations of various Imaging techniques used in medical field.
- Various method of accident prevention.

DETAILED SYLLABUS

EEC632 - BIO MEDICAL INSTRUMENTATION

Unit I Physiological & Clinical Measurement

Elementary ideas of cell structure, heart and circulatory system, control nervous system, Musclo-skeletal system, Respiratory system Body temperature and reproduction system. Bio ï potential and their generation ï resting and action potential ï propagation of action potential.

Electrodes ï Micro ï Skin ï surface ï needle electrodes Measurement of Blood pressure (direct, indirect) ï instantaneous flow (Electro magnetic flow meter, ultrasonic blood flow meter) ï blood pH Measurement of Respiration rate ï lung volume ï heart rate ï Temperature (body temperature & Skin temperature) Chromatography, Photometry, Flurometry.

Unit II Bio - Medical Recorders

Electro cardiograph (ECG) ï Lead system ï ECG electrodes ï ECG amplifiers ï ECG recording units ï analysis of ECG curves. Nervous system ï EEG recorder ï 10-20 lead system ï recording techniques ï EEG wave types ï Clinical use of EEG ï brain tumour Electro ï myograph (EMG) ï EMG waves ï measurement of conduction velocity ï EMG recording techniques ï Electro ï retinograph (ERG) Audiometer ï principle ï types ï Basics audiometer working

Unit III Therapeutic Instruments:

Cardiac pacemaker ï classification ï External pace makers ï implantable pacemaker ï pacing techniques ï programmable pacemaker ï power source of implantable pacemakers (Hg batteries,nuclear batteries, Lithium cells) Cardiac defibrillators ï types ï AC ï DC defibrillators Heart lung machine ï Oxygenators ï Blood pumps ï peristaltic pump ï Heart valves ï Problems of artificial heart valves. Dialysis ï Hemo dialysis ï peritoneal dialysis. Endoscopy ï principle of working and applications

Unit IV Bio – Telemetry And Patient Safety

Introduction ï physiological ï adaptable to bio ï telemetry ï components of a bio telemetry system ï application of telemetry in patient care ï problems associated with implantable telemetry. Fluid balance ï electrolytic balance ï acid base balance. Physiological efforts of electric current ï Micro and macro shock ï leakage current ï shock hazards from electrical equipment. Methods of Accident Prevention ï Grounding ï Double Insulation ï Protection by low voltage ï Ground fault circuit interrupter ï Isolation of patient connected parts ï Isolated power distribution system. Safety aspects in

electro surgical units ï burns, high frequency current hazards, Explosion hazards Telemedicine ï Introduction ï working ï applications

Unit V Modern Imaging Techniques

LASER beam properties ï block diagram ï operation of CO2 and NDYag LASER ï applications of LASER in medicine . X ray apparatus ï block diagram ï operation ï special techniques in X-ray imaging ï Tomogram ï computerized Axial tomography ï Ultrasonic imaging techniques ï Echo cardiography ï Angiography ï CT scanner - Magnetic resonance imaging techniques

Text Books

Sl.No.	Name of the Book	Author	Publisher
1	Bio Medical Instrumentation & Measurement	Leslie Cromwell	Prentice-Hall of India (P) Ltd., New Delhi

Reference Books

Sl.No.	Name of the Book	Author	Publisher
1	Medical Electronics	Kumara Doss	Khanna Pulishers, New Delhi
2	Medicine and Clinical Engineering	Jacobson and Webstar	Prentice-Hall of India (P) Ltd., New Delhi
3	Handbook of Bio ï Medical Instrumentation	R.S.Khandpur	Tata McGraw Hill Publishing Co., New Delhi
4	Introduction to Medical Electronics	B.R.Klein	G/L Tab Books

BIO MEDICAL INSTRUMENTATION

MODEL QUESTION PAPER - I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. (a) (1) Briefly explain action potential and respiration rate?

(2) Give four uses of electrodes and State the purpose of RL electrode in ECG.

(3) Explain Chromatography,Photometry and Flurometry

(b) (1) Write short notes on micro electrode..

(2) Explain about the lung volume measurement.

II. (a) (1) Analyze the waveforms obtained in ECG.

(2) Explain the working of ERG with neat block diagram.

(3) Describe Brain Tumor and what is the use of an Audiometer.

(b) (1) Explain the 10-20 lead system used in EEG with neat sketch.

(2) Explain about the basic block diagram of audiometer.

III. (a) (1) Differentiate internal & external pacemaker.

(2) Discuss about operation of heart lung machine.

(3) Explain the types of Blood pump.

(b) (1) Explain the working of dc defibrillator with a neat diagram.

(2) Briefly discuss about the working of endoscopy with a neat diagram.

IV. (a) (1) Differentiate micro and macro shock.

(2) Explain Fluid balance

(3) Write short notes on Biotelemetry.

(b) (1) List the various method of accident prevention and explain each.

(2) Draw the block diagram of Biotelementry system and explain.

V. (a) (1) Explain the application of laser in medicine.

(2) Write briefly about ultrasonic imaging technique.

(3) Explain application of computerized axial tomography.

(b) (1) Explain the working of a X- ray machine with block diagram.

(2) Explain the basic block diagram of Magnetic Resonance Imaging technique.

BIO MEDICAL INSTRUMENTATION

MODEL QUESTION PAPER - II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions

From (a) and any one division from (b) of each question.

(2) All the questions carry equal marks.

(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I. a) (1) Discuss about direct method of blood pressure measurement.

(2) Explain about chromatographic technique for analyzing various constituents present in blood samples.

(3) What are the salts responsible for the action of nesting potential and explain the instrument the used to analyse the working of brain

b) (1) Explain the different types of electrode used to measure bio potential.

(2) Draw the block diagram of Electromagnetic flow meter and explain its construction and application w .r. t biomedical.

II. a) (1) What is speech audiometry and explain the application of Audiometer?

(2) Briefly explain RL electrode in ECG and state its uses?

(3) Discuss the problems associated with implementable telementry.

b) (1) Draw the block diagram of ECG and explain its working.

(2) How conduction velocity muscle is measured.

III. a) (1) Describe cardiac pace maker .

(2) Explain macro shock? Enumerate the application of artificial heart valve.

(3) Explain hemodialyser?

b) (1) What is a pace maker ? List and explain the various power sources used for implantable pace marker?

(2) Draw the block diagram of heart machine and explain its working.

IV. a) (1) Explain the various components of biotelemetry.

(2) Explain in detail about the various methods of accident prevention.

(3) Explain the properties of Laser Beam.

b) (1) Explain the physiological effects of electrical current in detail.

(2) Write down the safety aspects in surgical unit.

V. a) (1) Mention any four medical application of LASER?

(2) What is the application of computerised axial tomography?

(3) Enumerate the application of computerised axial tomography?

b) (1) Explain the operation of CO2 LASER.

(2) Explain the working of magnetic resonance using a block diagram.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC633

Subject Title : COMPUTER HARDWARE AND NETWORKING

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours/ Semester	Internal	Autonomous Exam	Total
EEC633	Computer Hardware And Networking	**5**	**75**	**25**	**75**	**100**

Topics and Allocation:

Unit	**Topic**	**Time (Hrs)**
I	Motherboards and processors	14
II	Peripherals	14
III	I/O ports and External peripherals	14
IV	PC Assembling and Testing	14
V	Computer Network and Installation	14
	Revision and Test	5
Total		**75**

RATIONALE

Maintaining and servicing the computers, laptops and peripherals and constructing computer networks are taught in this subject which may be helpful for electrical students also as they use computers for simulations and in the control centers of industries.

OBJECTIVES

To Understand

- Familiarize themselves the evolution of PCs.
- Familiarize with the motherboards, memory chips.
- Familiarize with various Bus standards, chip sets and processors.
- Understand the operation of Keyboard, Mouse and Displays.
- Understand the concept of HDD, FDD and special devices.
- Understand the operation of CD and DVD.
- Familiarize with the working of video capture board, sound blaster cards.
- Understand the different I/O ports and SMPS used in the PCs.
- Understand the working of Modem, Digital camera, Printer and Scanners.
- Acquire knowledge about assembling of PC.
- Understand the concept of CMOS set up program & post diagnostics software and viruses.
- Familiarize with the different computer networks, network media and hardware.
- Understand the concept of installation & configuring network, network administration.

DETAILED SYLLABUS

EEC633 - COMPUTER HARDWARE AND NETWORKING

Unit I

Introduction: Evolution - PC through Pentium core2 Duo ï comparison chart -PC system units ï Front Panel / Rear side connectors, switches and indicators - specification parameters - Lap top PCs ï Palm top PCs.

Mother Board: Evolution ï Mother Board components - BIOS ï CMOS RAM ï Form Factor ï Riser Architecture ï Main Memory ï memory chips (SIMM, DIMM, RIMM) ï extended ï expanded ï cache ï virtual Memories.

Bus Standards: PC BUS ï ISA and Knowledge of other Busses ï PCI ï AGP ï USB Architectures, important signals ï comparison chart.

Chip sets: Introduction ï Intel chipset 945 series and knowledge of other chip sets ï AMD chipset series.

Processors: Introduction ï CISC Basic structure ï RISC basic structure ï evolution ï Intel CPUs(P IV, Dual core, Core DUO, Core2 DUO) ï AMD CPUs(K6, ATHLON, DURON) ï VIA Cyrix CPUs(6X86MX, VIA/CYRIX III, VIA SAMUEL II).

Unit II

Keyboard & Mouse: introduction ï keyboard operation ï key board signals ï keyboard interface logic ï wireless keyboard function ï Mouse construction - principle operation of Mouse ï optical mouse ï wireless mouse ï mouse signals ï Mouse Installation ï track pads.

Displays: Video basics ï anatomy of CRT, LCD and TFT displays - resolution ï interlacing - refresh rate ï dot pitch ï data projectors ï touch screens.

HDD: introduction ï HDD construction ï parameters ï operation- HDC block diagram ï working principle ï IDE, EIDE, SCSI, ultra ATA, and SATA series ï installation ï partitioningï partition table ï formatting ï FAT ï data reading ï data writing (FM, MFM) - Boot record - Directory structure.

FDD & Special Devices: Introduction ï disk construction ï types - FDD construction ï drive operation ï types ï FDC operation ï pen drives ï flash drives ï I pods.

CD &DVD: Introduction ï construction ï operation ï formats ï Technology DVD writer combo drive construction ï read/write operation ï DVD drive installation.

Unit III

Video Capture Board: Introduction ï block diagram of an integrated video capture/ VGA card ï connectors ï capture process ï audio and video capture and play back sequence ï compression and de-compression techniques.

Sound Blaster Card: Basics of digital sound ï audio compression and decompression ï sound blaster card ï installation ï MIDI ï 3D audio ï EAX ï MP3 ï SDMI.

I/O Ports & SMPS: serial - parallel port - game port ï controllers (Block Diagram) ï operation ï signals ï SMPS ï working ï block diagram ï AT & ATX connectors

Modem: Introduction ï functional block of modem ï working principle ï types ï installation.

Digital Camera: introduction ï construction ï operation ï SLR camera ï features.

Printer: introduction ï types ï dot matrix ï inkjet ï laser ï operation ï construction ï features ï installation ï troubleshooting.

Scanner: Introduction ï operation ï scan resolution ï color scanners ï scan modes ï file formats.

Unit IV

PC Assembly: Power supplies-Configuring mother board/jumper settingï connectorsï cables - Adding memory modules ï assembling a computer ï upgrading a PC.

CMOS setup program & POST: CMOS setup program - various setup options ï POST definition ï IPL hardware ï POST test sequence ï beep codes ï error messages.

Diagnostic Software & Viruses: PC latest diagnostic software ï bench mark programs ï computer viruses ï Precautions ï Anti-virus software ï signature of viruses ï Fire walls.

Unit V

Computer Network Basics: Introduction ï OSI layer model - network types ï LAN- WAN ï CAN ï MAN ï HAN ï internet ï intranet ï extranet ï uses ï Blue tooth Technology.

Local Area Network: LAN topologies ï star ï ring ï mesh ï bus ï Client/Server ï peer to peer.

Network Media & Hardware: Twisted wire - Coaxial cable - fiber optic cable ï flow control ï Ethernet ï Arc net ï Router ï active hub - passive hub ï wireless network ï blue tooth dongle.

Installing and configuring Network (Windows NT 2003): Network Components and Connectors ï Installing NIC ï Installing Cables ï Hub ï Setting up NIC ï Network Setup Wizard ï Working with Network resources ï Sharing resources on Network ï New Connection Wizard.

Network Administration(Windows NT 2003): User Accounts and Groups ï Working with User Accounts & security ï passwords - Group Membership Profiles ï Working with Groups ï Granting Permissions ï Managing Shares ï Switching Between Users.

Text Books:

Sl.No.	Name of the Book	Author	Publisher
1.	Computer Installation and Servicing	D. Balasubramanian	TMH Publishing Company, New Delhi

Reference books:

Sl.No.	Name of the Book	Author	Publisher
1.	IBM PC and Clones	Govindarajulu	TMH Publishing Company, New Delhi.
2.	Computer Installation & Troubleshooting	M. Radhakrishnan D. Balasubramanian	ISTE Learning Material.
3	Introduction to Computers	Peter Norton	TMH Publishing Company, New Delhi.
4	Troubleshooting, Maintaining & Repairing PCs	Stephen J. Bigelow	TMH Publishing Company.
5	Local Networks ï An introduction to the technology	McNamara John. E	PHI.

COMPUTER HARDWARE AND NETWORKING

MODEL QUESTION PAPER -I

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I	a)	(1)	Describe Motherboard in short.
		(2)	What are the types of bus architecture?
		(3)	Draw the block diagram of MCA architecture.
	b)	(1)	What are the main units of system? Explain in detail.
		(2)	Explain in detail about INTEL CPUs.
II	a)	(1)	Write short notes on guns in a colour CRT?
		(2)	Explain about keyboard interface logic.
		(3)	Explain briefly about IPODS.
	b)	(1)	Explain in detail about mouse signals and keyboard signals.
		(2)	Draw the block diagram of DVD Drive and explain.
III	a)	(1)	Describe I/O ports.
		(2)	Explain briefly about parallel port.
		(3)	What are the functional blocks of Modem and its types?
	b)	(1)	Explain in detail about dot matrix printer.
		(2)	Explain compression and decompression technique.
IV	a)	(1)	What is virus scanner?
		(2)	Explain about visual error code.
		(3)	List out the virus protection techniques.
	b)	(1)	List out the tests performed by POST.
		(2)	Explain about firewall with diagram.
V	a)	(1)	Write short notes on topology.
		(2)	Explain about Ethernet.
		(3)	Give out the steps for installing NIC.
	b)	(1)	Describe the detail of new connection wizard.
		(2)	Briefly explain network interface card and network hub.

COMPUTER HARDWARE AND NETWORKING

MODEL QUESTION PAPER -II

Time- 3 hours (Max.Mark:75)

[N.B:- (1) Answer all questions, Choosing any two divisions
From (a) and any one division from (b) of each question.
(2) All the questions carry equal marks.
(3) Each division in (a) carries 4 marks and in (b) carries 7 marks.]

I	a)	(1)	Explain the use of RAM BIOS?
		(2)	Explain anyone form factor
		(3)	Explain about SIMM.
	b)	(1)	Explain about RISC & CISC Processors.
		(2)	Explain in detail about Mother Board components.
II	a)	(1)	What are the different types of CDs?
		(2)	Explain about IDE.
		(3)	Explain the working of Mouse.
	b)	(1)	Explain about anatomy of CRT with neat sketch.
		(2)	Draw the block of DVD Drive and explain
III	a)	(1)	Explain the components of Graphics card?
		(2)	Explain in detail about sound blaster card?
		(3)	Draw the block diagram of Digital camera and explain shortly.
	b)	(1)	Bring out the problems and diagnostic procedure of laser printer.
		(2)	Explain in detail about file format.
IV	a)	(1)	Explain about line conditioner.
		(2)	What are the types of computer viruses? Explain any one.
		(3)	What are the connectors available in Motherboard? Draw the schematic diagram
	b)	(1)	Explain with neat sketch about servo stabilizer.
		(2)	Explain about QA plus.
V	a)	(1)	Compare LAN and WAN.
		(2)	Explain bus topology.
		(3)	Explain about the coaxial cable.
	b)	(1)	Explain in detail about OSI 7 layer model
		(2)	Explain the working environment with user accounts and security.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC640

Subject Title : ELECTRICAL WORKSHOP PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC640	**ELECTRICAL WORKSHOP PRACTICAL**	**3**	**45**	**25**	**75**	**100**

RATIONALE

To impart practical knowledge to the diploma students in servicing of domestic appliances, this subject is introduced. This subject aims to develop skill on assembling and test of household electrical appliances.

OBJECTIVE

At the end of the practical the student will be able to

- Identify and use the tools used in servicing of electrical appliances.
- Assemble the various parts of domestic appliances.
- Make the electrical connections and test its performance

LIST OF EXPERIMENTS

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 microwave oven, identifying the parts, checking the conditions, assembling and testing

LIST OF EQUIPMENTS

S.No	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1.	Tools: Screw driver, Cutting pliers, Wire Stripper, Hammer, Spanner set, Line Tester, Nose pliers.	Each 2 set
2.	Personal Protective Equipments: Safety helmet, Google, Safety gloves, Nose mask, Ear plug, Safety Belt.	Each 2 Set
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.	Microwave oven	1
13.	Multi meter	8
14.	Induction Heater	1

QUESTION PATTERN

S.No.	NAME OF THE ACTIVITY	MARKS ALLOCATED
1.	**Connection Diagram**	10
2.	**Tools Required**	10
3.	**Dismantling and Assembling Procedure**	30
4.	**Testing**	20
5.	**Viva Voce**	05
	TOTAL	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC650

Subject Title : ELECTRICAL CIRCUITS SIMULATION

PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC650	Electrical Circuits Simulation Practical	**3**	**45**	**25**	**75**	**100**

RATIONALE

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

OBJECTIVES

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

- Know the various aspects of simulation software
- Simulate and test the simple electrical and electronics circuits
- Simulate and test the wave generating circuits
- Simulate and test the performance characteristics of converters
- To design and verify the results of various electric circuits using simulation software.

LIST OF EXPERIMENTS

EEC650 - ELECTRICAL CIRCUITS SIMULATION PRACTICAL

1. a)Generate sinusoidal waveform for a RMS voltage ____ V and frequency of ___ Hz.
   b) Generate a complex signal comprising of fundamental, 5th harmonics and 7th harmonics frequency
2. Step response of RL & RC series circuits.
3. a) Simulation of RLC series response circuits
   b) Simulation of RLC parallel response circuits
4. Verification of Superposition theorem.
5. Verification of Theveninôs theorem.
6. Simulation of single phase, half wave converter using SCR with R-load.
7. Simulation of single phase full converter with RL load.
8. Simulation of DC step down chopper.
9. Simulation of single phase inverter.
10. Simulation of three phase voltage source inverter supplying R-load
11. a) Simulation of three phase star connected balanced load
    b) Simulation of three phase star connected unbalanced load
12. a) Simulation of three phase delta connected balanced load
    b) Simulation of three phase delta connected unbalanced load
13. a) Simulation of three phase non-linear star connected load with three phase 3 wire system.
    b) Simulation of three phase non-linear star connected load with three phase 4 wire system.
14. Real time control of PMDC motor

S.No.	LIST OF EQUIPMENTS	QUANTITY REQUIRED
1.	PC with any suitable simulation software	30
2.	UPS 5KVA with half an hour battery back up	1
3.	Printer	1

QUESTION PATTERN

S.No	NAME OF THE ACTIVITY	MARK ALLOCATION
1.	Circuit Diagram (Manual Diagram)	20
2.	Development of circuit diagram	35
3.	Simulation Performance & print out	15
4.	Viva Voce	05
	TOTAL	**75**

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC661

Subject Title : POWER ELECTRONICS AND DRIVES PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC661	**Power Electronics and Drives Practical**	**6**	**90**	**25**	**75**	**100**

RATIONALE

The advent of thyristors has revolutionized the art of electric power conversion and its control. The use of the power electronic devices has pervaded the industrial applications relating to the field of Electrical and Electronics, Instrumentation and Control Engineering.

This subject is introduced to impart practical skills to the students in using some important power electronic devices and circuits.

OBJECTIVES

Construct and test DC-DC, DC-AC, AC-DC, AC-AC converters using power switching devices and control circuits for the same.

EEC661 - POWER ELECTRONICS AND DRIVES PRACTICAL

LIST OF EXPERIMENTS

1. Construct and test Line synchronized, Ramp and Pedestal UJT trigger circuit with AC load
2. Construct and test Single phase Half Controlled Bridge with R load
3. Construct and test Single phase Full Controlled Bridge with RL load
4. Construct and test Lamp control circuit using DIAC ï TRIAC
5. Construct and test SCR commutation circuits (Class B and Class D)
6. Construct and test Single phase Parallel Inverter using MOSFET / IGBT
7. Construct and test control circuit for DC chopper using thyristor (any class)
8. Construct and test Single phase to Single phase cycloconverter
9. Construct and test control circuit for Universal motor using TRIAC
10. Construct and test Open loop speed control circuit for DC shunt motor
11. Construct and test Closed loop speed control circuit for DC motor with loading arrangement
12. Construct and test Closed loop speed control circuit for Single phase AC motor
13. Construct and test PWM based step down DC chopper using MOSFET/IGBT
14. Construct and test Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT
15. Construct and test SMPS using MOSFET/IGBT
16. Construct and test three phase half bridge and full bridge converter.

QUESTION PATTERN

S.NO	NAME OF THE ACTIVITY	MARK ALLOCATION
1	CIRCUIT DIAGRAM	25
2	CONNECTIONS	20
3	READING/GRAPH/RESULT	25
5	VIVA VOCE	05
	TOTAL	75

LIST OF EQUIPMENTS

S.NO	NAME OF THE EQUIPMENT	NO OF QUANTITY
1.	Line synchronized Ramp trigger circuit using UJT trainer kit.	1
2.	Lamp control circuit using DIAC – TRIAC trainer kit.	1
3.	SCR commutation circuits (Class B & Class D)	1
4.	Construct and test the Single phase semi controlled bridge with R- Load trainer kit.	1
5.	Single phase fully controlled bridge with RL- Load trainer kit.	1
6.	Three phase half bridge converter Three phase full bridge converter	Each 1
7.	Construct and test the DC chopper control circuit using thyristor (any class) trainer kit.	1
8.	PWM based step down DC chopper using MOSFET/IGBT trainer kit.	1
9.	Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT trainer kit.	1
10.	SMPS using MOSFET/IGBT trainer kit.	
11.	Open loop speed control circuit for DC shunt motor trainer	1
12.	Closed loop speed control circuit for DC shunt motor trainer	
13.	Control circuit using TRIAC for Universal motor trainer kit.	1
14.	Closed loop speed control of Single phase AC motor trainer kit.	1
15.	Single phase parallel inverter using MOSFET/IGBT trainer kit	1
16.	Single phase to single phase cyclo converter trainer kit	1
17.	CRO with power probe	4
18.	Multi meter	3
19.	R-load	2
20.	RL load	2

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC662

Subject Title : BIO MEDICAL INSTRUMENTATION PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC662	Bio Medical Instrumentation Practical	6	90	25	75	100

RATIONALE

To provide hands on experience to the diploma students, in handling and servicing instruments used in hospitals and to support the aim and objective of Bio medical Instrumentation theory Subject, this practical subject is introduced.

OBJECTIVE

On completion of this subject, the student must be able to

- Handle the mentioned instruments used in medical field
- Construct and verify the mentioned circuits used in medical instruments

LIST OF EXPERIMENTS

EEC662 - BIO MEDICAL INSTRUMENTATION PRACTICAL

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:
    a. Cardiac monitor.
    b. Vascular probe with vasoline monitor.
    c. ECG stimulator.
    d. Muscle stimulator.
    e. Vectorodyne electrotherapy equipment.
    f. Vascular Doppler recorder.
    g. Pressure plethysmograph.
    h. Skin sympathetic response meter.

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC663

Subject Title : COMPUTER HARDWARE AND NETWORKING PRACTICAL

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC663	**Computer Hardware & Networking Practical**	**6**	**90**	**25**	**75**	**100**

RATIONALE:

The course aims at making the students familiar with various parts of computers and laptops and how to assemble them and the different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer and laptop software installation and maintenance and to make him diagnose the software faults. This subject also gives the knowledge and competency to diagnose the problems in computer hardware and peripherals and also gives the knowledge for trouble shooting for systematic repair and maintenance of computers and laptops.

OBJECTIVES

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

Know the various indicators, switches and connectors used in Computers.

Familiarize the layout of SMPS, motherboard and various Disk Drives.

Configure Bios set up options.

Install various secondary storage devices with memory partition and formatting.

Know the various types of printer installation and to handle the troubleshooting ability.

Assemble PC system and checking the working condition.

Installation of Dual OS in a system.

Identify the problems in Computer systems, software installation and rectification

Assembling and disassembling of Laptop to identify the parts and to install OS and configure it.

Enable to perform different cabling in a network.

Configure Internet connection and use utilities to debug the network issues.

Configure router for any topology

Install and configure Windows 2008 / 2013 Server

Design Windows server Active directory Services.

Install and configure server hardware devices.

EEB663 - COMPUTER HARDWARE & NETWORKING PRACTICAL

LIST OF EXERCISES

PART A - COMPUTER SERVICING AND NETWORK PRACTICAL

Introduction : Switches, Indicators and connectors of PC: Identification of front panel indicators and switches in a computer system of table top/ tower case model and also identification of rear side connectors.

1. PC system layout: Draw a Computer system layout and Mark the positions of SMPS, Mother Board, FDD, HDD, and CD-Drive/DVD-Drive add on cards in table top / tower model systems.

2. Mother Board Layout: Draw the layout of Pentium IV or Pentium Dual core or Pentium Core2 DUO mother board and mark Processor, Chip set ICs. RAM, Cache, XTAL, cooling fan, I/O slots and I/O ports and various jumper settings.

3. CMOS Setup Program: 1. Changing the Standard settings
   2. Changing advanced settings (BIOS and Chipset features)

4. HDD Installation:
   1. Install the given HDD.
   2. Configure in CMOS-Setup program.
   3. Partition the HDD using fdisk.
   4. Format the Partitions.

5. Printer Installation & Troubleshooting:
   1. Installing and checking a Dot-Matrix Printer.
   2. Installing and checking an Ink jet / Laser Printer.
   3. Possible problems and troubleshooting.

6. Modem Installation: 1. Install and configure a Modem in a windows PC.

2. Check the working condition of modem with PC.

7. DVD Multi-recorder drive installation:
    1. Install a DVD Multi-recorder drive in a PC.
    2. Configure using device driver.
    3. Check the read / write operation using a cd / dvd.

8. Familiarize : Scandisk, recent Anti-virus software and recent PC Diagnostic software.

PART B – SYSTEM ADMINISTRATION PRACTICAL

9. Assembling a PC: Assemble a Pentium IV or Pentium Dual Core or Pentium Core2 Duo system with necessary peripherals and check the working condition of the PC.

10. Install and Configure Windows 2008 operating system in a PC.

11. Construct Network by connecting one or two computer with a Windows 2013 Server.

12. Install and Configure LINUX operating system in a PC.

13. Construct Network by connecting one or two computer with a LINUX Server.

14. Configure the network for an Internet server.

15. Add / Remove devices using Hardware Wizard.

16. Add and Manage User Profile, Set permission to the users both in Windows 2013/ LINUX.

Note:

The students must and should install software's. After the demonstration, the same is uninstalled. Each batch has to learn to install and use the tools.

REQUIREMENTS

Hardware Requirements :	
Desktop Systems	30 Nos
Hard disk drive	06 Nos
DVD, Blu-ray Drive	06 Nos
Blank DVD , Blu-ray Disc	20 Nos
Head cleaning CD	
Dot matrix Printer	02 Nos
Laser Printer	02 Nos
Server	01 No
Mobile phones	06 Nos
Network Requirements:	
Crimping Tool	06 Nos
Screwdriver set	06 Nos
Network Cables	
Modem	02 Nos
Hub	01 No
Router	01 No
Switch	02 Nos
Software Requirements:	
Windows OS	
Windows Server 2008 / 2013 and LINUX.	
Antivirus software.	
DVD and Blu-ray Burning S/W.	
Mobile Phone Flashing S/W	

SCHEME OF VALUATION

Procedure Writing **–** One Question from PART **–** A	10 Marks
Procedure Writing **–** One Question from PART - B	15 Marks
Executing Exercise (PART **–** A)	10 Marks
Executing Exercise (PART **–** B)	25 Marks
Result (PART **–** A)	5 Marks
Result (PART **–** B)	5 Marks
VIVA **–** VOCE	5 Marks
TOTAL	75 Marks

EEC670 – PROJECT WORK AND VIVA VOCE

C- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : Diploma in Electrical and Electronics Engineering

Course code : 1030

Semester : VI

Subject code : EEC670

Subject Title : PROJECT WORK AND VIVA VOCE

Scheme of Instruction and Examination

Total No. of Weeks / Semester : 15 weeks

Subject Code	Subject	Instruction		Examination		
				Assessment Marks		
		Hours / Week	Hours / Semester	Internal	Autonomous Exam	Total
EEC670	**Project Work and Viva Voce**	**6**	**90**	**25**	**75**	**100**

SYLLABUS:

1. ENVIRONMENTRAL MANAGEMENT:

(a) Introduction ï Environmental Ethics ï Assessment of Socio Economic Impact ï Environmental Audit ï Mitigation of adverse impact on Environment ï Importance of Pollution Control ï Types of Industries and Industrial Pollution.

(b) Solid waste management ï Characteristics of Industrial wastes ï Methods of Collection, transfer and disposal of solid wastes ï Converting waste to energy ï Hazardous waste management Treatment technologies.

(c) Waste water management ï Characteristics of Industrial effluents ï Treatment and disposal methods ï Pollution of water sources and effects on human health.

(d) Air pollution management ï Sources and effects ï Dispersion of air pollutants ï Air pollution control methods ï Air quality management.

(e) Noise pollution management ï Effects of noise on people ï Noise control methods.

2. DISASTER MANAGEMENT:

(a) Introduction ï Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc ï Man made Disasters ï Crisis due to fires, accidents, strikes etc ï Loss of property and life.

(b) Disaster Mitigation measures ï Causes for major disasters ï Risk Identification ï H azard Zones ï Selection of sites for Industries and residential buildings ï Minimum distances from Sea ï Orientation of Buildings ï Stability of Structures ï Fire escapes in buildings - Cyclone shelters ï Warning systems.

(c) Disaster Management ï Preparedness, Response, Recovery ï Arrangements to be made in the industries / factories and buildings ï Mobilization of Emergency Services - Search and Rescue operations ï First Aids ï Transportation of affected people ï Hospital facilities ï Fire fighting arrangements ï Communication systems ï Restoration of Power supply ï Getting assistance of neighbours / Other organizations in Recovery and Rebuilding works ï Financial commitments ï Compensations to be paid ï Insurances ï Rehabilitation.

List of Questions

1. ENVIRONMENTRAL MANAGEMENT:

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?
4. What is the necessity of pollution control? What are all the different organizations you know, which deals with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste ?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal ?
11. What are the different methods of disposal of solid wastes ?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term ôEnvironmental Waste Auditô.

14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
16. Describe any two methods of converting waste into energy.
17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
22. Explain briefly the Physical treatments ñSedimentationò and ñFloatationò processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.
28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.

39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source ï Path ï Receiver concept of Noise control.
43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

2. DISASTER MANAGEMENT:

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.
7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes ? How they are measured ? Which parts of India are more vulnerable for frequent earthquakes ?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie : (a) Chennai (b) Nagapattinum (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone ï A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and

cyclones.

15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings ? What are its requirements ?
20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster ?

25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?
28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of

continuous strike by Public Transport workers?

35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?

41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in-adequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants