SYLLABUS

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

FULL TIME, SANDWICH & PART TIME

2015 – 2016

M – SCHEME

DIRECTORATE OF TECHNICAL EDUCATION

GOVERNMENT OF TAMILNADU

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

Syllabus Revision Committee

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DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY

(SEMESTER SYSTEM)

(Implemented from 2015- 2016)

M – SCHEME

R E G U L A T I O N S*

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

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 (3½ years)

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

During 4th and/or during 7th 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 diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

* Each Semester will have 15 weeks duration of study with 35 hrs. /Week for Regular Diploma Programme and 18hrs/ week (21 hrs. / Week I year) for Part-Time Diploma Programmes.

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2015 – 2016 academic year onwards.

2. Condition for Admission:

Condition for admission to the diploma courses shall be required to have passed in

The S.S.L.C Examination of the Board of Secondary Education, 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	
		Subjects Studied	Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretaryship.

- 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.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.

- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit: No Age limit.

5. Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to 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	3½ Years	6½ 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. The curriculum outline is given in Annexure **- I**

8. Examinations:

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

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

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 as per the range given below)

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

ii) Test # **10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: 05 marks

The Test – 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	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examination-question paper-pattern).	End of 15th week	75	3 Hrs

 # - From the Academic year 2015-2016 onwards.

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

With no choice:

PART A type questions:	4 Questions X 2 mark	… … 8 marks
PART B type questions:	4 Questions X 3 marks	… … 12 marks
PART C type questions:	3 Questions X 10 marks	… … 30 marks

	Total	50 marks
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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 mark for a total of 25 marks which are to be distributed as follows:-

a)	Attendance	:	**5 Marks**
	(Award of marks as same as Theory subjects)		
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 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 Practical Board Examinations.

- *All the marks awarded for assignment, Test 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 Skill 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 the students:

Internal assessment Mark **….. 25 Marks**

11. Project Work:

The students of all the Diploma Programmes **(except Diploma in Modern Office Practice)** 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	…	**10 marks**
Attendance	…	**05 marks** (award of marks same as theory subjects pattern)
Total	…	**25 marks**

Proper record 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 Mark for Project Work & Viva Voce in Board Examination:

Viva Voce	…	**30 marks**
Marks for Report Preparation, Demo	…	**35 marks**
Total		**65 marks**

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

i) Environment Management	2 questions X 2 ½ marks	= **5 marks**
iI) Disaster Management	2 questions X 2 ½ marks	= **5 marks**
		10marks

$ **-** 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 Board Examination	--	**65 Marks**
Written Test Mark (from 2 topics for 30 minutes duration)	--	**10 Marks**
TOTAL	--	**75 Marks**

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

12. Scheme of Examinations:

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

13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the 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 subject* out of the total prescribed maximum marks including both the internal assessment and the Board Examination marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board's Theory examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2018 onwards (Joined in first year in 2015-2016) 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/ 3½/ 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 of marks in all the

semesters put together and passes all the semesters except the I and II semesters in the first appearance itself and passes all the subjects within the stipulated period of study 3/ 3½/ 4 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 semesters put together and passes all the subjects within the stipulated period of study 3/ 3½ / 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-Time students who pass out Final Examination from October 2018 /April 2019 onwards (both joined in First Year in 2015-2016)

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

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

16. Seminar:

For seminar the total seminar 15 hours(15 weeks x 1hour) 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 member, 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 inspection/verification.

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ANNEXURE-I
CURRICULUM OUTLINE
Diploma in Electrical and Electronics Engineering (Full Time) (1030)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33031	Electrical Circuit Theory	6	--	6
33032	Electrical Machines-I	5	--	5
34031	Electronic Devices and Circuits *	6	--	6
33034	Electrical Circuits and Machines Practical	--	5	5
34034	Electronic Devices and Circuits Practical *	--	5	5
33036	Electrical Work Shop Practical	--	3	3
30001	Computer Applications Practical #	--	4	4
Seminar		1	--	1
Total Hours		**18**	**17**	**35**

*** Common with ECE branch** **# Common with ALL branches**

IV SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33041	Electrical Machines – II	6	--	6
33042	Measurements and Instruments	5	--	5
34043	Digital Electronics *****	5	--	5
33044	Transducers and Signal Conditioners	4	--	4
33045	Electrical Machines and Instrumentation Practical	--	5	5
34046	Integrated Circuits Practical*	--	5	5
30002	Life and Employability Skill Practical #	--	4	4
Seminar		1	--	1
Total Hours		**21**	**14**	**35**

***Common with ECE branch** **# Common with ALL branches**

V SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33051	Generation Transmission and Switchgear	6	--	6
34052	Micro Controller*	6	--	6
33053	Electrical Estimation and Energy Auditing	5	--	5
	Elective Theory-I	5	--	5
33055	Computer Aided Electrical Drawing Practical	--	4	4
34056	Micro Controller Practical*	--	4	4
	Elective Practical – I	--	4	4
Seminar		1	--	1
Total Hours		**23**	**12**	**35**

*** Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective -I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VI SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33061	Distribution and Utilization	6	--	6
33062	Operation and Maintenance of Electrical Equipment	5	--	5
	Elective Theory-II	5	--	5
33064	Wiring and Winding Practical	--	5	5
33065	Electrical Circuits Simulation Practical	--	4	4
	Elective Practical – II	--	5	5
33067	Project Work	--	4	4
Seminar		1	--	1
Total Hours		**17**	**18**	**35**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	33085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ Common with Information Technology

CURRICULUM OUTLINE
Diploma in Electrical and Electronics Engineering (Part Time)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
33031	Electrical Circuit Theory	4.5	--	--	4.5
33032	Electrical Machines-I	4.5	--	--	4.5
30016	Engineering Graphics-I	--	3	--	3
33034	Electrical Circuits and Machines Practical	--	--	3	3
33036	Electrical Work Shop Practical	--	--	3	3
Total Hours		**9**	**3**	**6**	**18**

IV SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK			
		Theory Hours	Drawing Hours	Practical Hours	Total Hours
34031	Electronic Devices and Circuits *	4.5	--	--	4.5
33044	Transducers and Signal Conditioners	4.5	--	--	4.5
30026	Engineering Graphics-II	--	3	--	3
34034	Electronic Devices and Circuits Practical *	--	--	3	3
30001	Computer Applications Practical #	--	--	3	3
Total Hours		**9**	**3**	**6**	**18**

*** Common with ECE branch** **# Common with ALL branches**

V SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33041	Electrical Machines – II	4	--	4
33042	Measurements and Instruments	4	--	4
34043	Digital Electronics *	4		4
33045	Electrical Machines and Instrumentation Practical	--	3	3
34046	Integrated Circuits Practical*	--	3	3
Total Hours		**12**	**6**	**18**

*** Common with ECE branch**

VI SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33051	Generation transmission and switch gear	4.5	--	4.5
34052	Operation and maintenance of Electrical Equipment	4.5	--	4.5
33065	Electrical Circuits Simulation Practical	--	3	3
33055	Computer Aided Electrical drawing	--	3	3
30002	Life and Employability Skill Practical #	--	3	3
Total Hours		**9**	**9**	**18**

 # Common with ALL branches

VII SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
34052	Micro controller*	4	--	4
33053	Electrical Estimation and Energy Auditing	4	--	4
	Elective Theory-I	4	--	4
34056	Micro Controller Practical*	--	3	3
	Elective Practical – I	--	3	3
Total Hours		**12**	**6**	**18**

*** Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VIII SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33061	Distribution and utilization	4.5	--	4.5
	Elective Theory-II	4.5	--	4.5
33064	Wiring and Winding Practical	--	3	3
	Elective Practical – II	--	3	3
33067	Project Work		3	3
Total Hours		**9**	**9**	**18**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as** **Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	34085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ Common with Information Technology

CURRICULUM OUTLINE
Diploma in Electrical and Electronics Engineering (Sandwich)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33031	Electrical Circuit Theory	5	--	5
33032	Electrical Machines-I	5	--	5
34031	Electronic Devices and Circuits *	5	--	5
33042	Measurements and Instruments	4	--	4
33034	Electrical Circuits and Machines Practical	--	4	4
34034	Electronic Devices and Circuits Practical *	--	4	4
33036	Electrical Work Shop Practical	--	3	3
30001	Computer Applications Practical #	--	4	4
	Seminar	1	-	1
Total Hours		**20**	**15**	**35**

*** Common with ECE branch** **# Common with ALL branches**

IV SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33041	Electrical Machines – II	5	--	5
33045	Electrical Machines and Instrumentation Practical	--	5	5
30002	Life and Employability Skill Practical #	--	4	4
33091	In Plant Training	--	--	--
	Seminar	1	-	1
Total Hours		**6**	**9**	**15**

 # Common with ALL branches

V SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33051	Generation Transmission and Switchgear	5	--	5
34043	Digital Electronics *****	5	--	5
33044	Transducers and Signal Conditioners	4	--	4
33062	Operation and maintenance of Electrical Equipment	4		4
	Elective Theory-I	4	--	4
33055	Computer Aided Electrical drawing Practical	--	4	4
34046	Integrated Circuits Practical*	--	4	4
	Elective Practical – I	--	4	4
	Seminar	1	-	1
Total Hours		**23**	**12**	**35**

*** Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VI SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33061	Distribution and Utilization	4	--	4
33053	Electrical Estimation and Energy Auditing	4	--	4
34052	Micro controller*	5	--	5
	Elective Theory-II	5	--	5
33064	Wiring and Winding Practical	--	4	4
34056	Micro Controller Practical*		4	4
33065	Electrical Circuits Simulation Practical	--	4	4
	Elective Practical – II	--	4	4
	Semiar	1	-	1
Total Hours		**19**	**16**	**35**

*** Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	34085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ Common with Information Technology

VII SEMESTER

Subject Code	SUBJECT	HOURS PER WEEK		
		Theory Hours	Practical Hours	Total Hours
33067	Project Work	4	--	4
33092	In Plant Training	--	--	--
Total Hours		**4**	**--**	**4**

ANNEXURE-II
Scheme of Examination
Diploma in Electrical and Electronics Engineering (Full Time)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33031	Electrical Circuit Theory	25	75	100	40	3
33032	Electrical Machines-I	25	75	100	40	3
34031	Electronic Devices and Circuits *	25	75	100	40	3
33034	Electrical Circuits and Machines Practical	25	75	100	50	3
34034	Electronic Devices and Circuits Practical *	25	75	100	50	3
33036	Electrical Work Shop Practical	25	75	100	50	3
30001	Computer Applications Practical #	25	75	100	50	3
Total		**175**	**525**	**700**	**320**	

*** Common with ECE branch** **# Common with ALL branches**

IV SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33041	Electrical Machines – II	25	75	100	40	3
33042	Measurements and Instruments	25	75	100	40	3
34043	Digital Electronics *****	25	75	100	40	3
33044	Transducers and Signal Conditioners	25	75	100	40	3
33045	Electrical Machines and Instrumentation Practical	25	75	100	50	3
34046	Integrated Circuits Practical*	25	75	100	50	3
30002	Life and Employability Skill Practical #	25	75	100	50	3
Total		**175**	**525**	**700**	**310**	

*** Common with ECE branch** **# Common with ALL branches**

V SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33051	Generation transmission and switchgear	25	75	100	40	3
34052	Micro controller*	25	75	100	40	3
33053	Electrical Estimation and Energy Auditing	25	75	100	40	3
	Elective Theory-I	25	75	100	40	3
33055	Computer Aided Electrical drawing Practical	25	75	100	50	3
34056	Micro Controller Practical*	25	75	100	50	3
	Elective Practical – I	25	75	100	50	3
Total		**175**	**525**	**700**	**310**	

* **Common with ECE branch** **# Common with ALL branches**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VI SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33061	Distribution and Utilization	25	75	100	40	3
33062	Operation and Maintenance of Electrical Equipment	25	75	100	40	3
	Elective Theory-II	25	75	100	40	3
33064	Wiring and Winding Practical	25	75	100	50	3
33065	Electrical Circuits Simulation Practical	25	75	100	50	3
	Elective Practical – II	25	75	100	50	3
33067	Project Work	25	75	100	50	3
Total		**175**	**525**	**700**	**320**	

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	33085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ Common with Information Technology

Scheme Of Examination
Diploma in Electrical and Electronics Engineering (Part Time)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33031	Electrical Circuit Theory	25	75	100	40	3
33032	Electrical Machines-I	25	75	100	40	3
30016	Engineering Graphics-I	25	75	100	40	3
33034	Electrical Circuits and Machines Practical	25	75	100	50	3
33036	Electrical Work Shop Practical	25	75	100	50	3
Total		**125**	**375**	**500**	**220**	

IV SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
34031	Electronic Devices and Circuits *	25	75	100	40	3
33044	Transducers and Signal Conditioners	25	75	100	40	3
30026	Engineering Graphics-II	25	75	100	40	3
34031	Electronic Devices and Circuits Practical *	25	75	100	50	3
30001	Computer Applications Practical #	25	75	100	50	3
Total		**125**	**375**	**500**	**220**	

*** Common with ECE branch** **# Common with ALL branches**

V SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33041	Electrical Machines – II	25	75	100	40	3
33042	Measurements and Instruments	25	75	100	40	3
34043	Digital Electronics *	25	75	100	40	3
33045	Electrical Machines and Instrumentation Practical	25	75	100	50	3
34046	Integrated Circuits Practical*	25	75	100	50	3
Total		**125**	**375**	**500**	**220**	

*** Common with ECE branch**

VI SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33051	Generation transmission and switchgear	25	75	100	40	3
33062	Operation and maintenance of Electrical Equipment	25	75	100	40	3
33065	Electrical Circuits Simulation Practical	25	75	100	50	3
33055	Computer Aided Electrical drawing	25	75	100	50	3
30002	Life and Employability Skill Practical #	25	75	100	50	3
Total		**125**	**375**	**500**	**230**	

 # Common with ALL branches

VII SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
34052	Micro controller*	25	75	100	40	3
33053	Electrical Estimation and Energy Auditing	25	75	100	40	3
	Elective Theory-I	25	75	100	40	3
34056	Micro Controller Practical*	25	75	100	50	3
	Elective Practical – I	25	75	100	50	3
Total		**125**	**375**	**500**	**220**	

* **Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VIII SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33061	Distribution and utilization	25	75	100	40	3
	Elective Theory-II	25	75	100	40	3
33064	Wiring and Winding Practical	25	75	100	50	3
	Elective Practical – II	25	75	100	50	3
33067	Project Work	25	75	100	50	3
Total		**125**	**375**	**500**	**230**	

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as** **Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	33085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ **Common with Information Technology**

Scheme of Examination
Diploma in Electrical and Electronics Engineering (Sandwich)(2030)
M– Scheme

III SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33031	Electrical Circuit Theory	25	75	100	40	3
33032	Electrical Machines-I	25	75	100	40	3
34031	Electronic Devices and Circuits *	25	75	100	40	3
33042	Measurements and Instruments	25	75	100	40	3
33034	Electrical Circuits and Machines Practical	25	75	100	50	3
34034	Electronic Devices and Circuits Practical *	25	75	100	50	3
33036	Electrical Work Shop Practical	25	75	100	50	3
30001	Computer Applications Practical #	25	75	100	50	3
Total		**200**	**600**	**800**	**360**	

*** Common with ECE branch** **# Common with ALL branches**

IV SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33041	Electrical Machines – II	25	75	100	40	3
33045	Electrical Machines and Instrumentation Practical	25	75	100	50	3
30002	Life and Employability Skill Practical #	25	75	100	50	3
33091	In Plant Training	25	75	100	50	3
Total		**100**	**300**	**400**		

V SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33051	Generation transmission and switchgear	25	75	100	40	3
34043	Digital Electronics *	25	75	100	40	3
33044	Transducers and Signal Conditioners	25	75	100	40	3
33062	Operation and maintenance of Electrical Equipment	25	75	100	40	3
	Elective Theory-I	25	75	100	40	3
33055	Computer Aided Electrical drawing	25	75	100	50	3
34046	Integrated Circuits Practical*	25	75	100	50	3
	Elective Practical – I	25	75	100	50	3
Total		**200**	**600**	**800**	**360**	

*** Common with ECE branch**

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –I**			
Elective Theory – I		**Elective Practical – I**	
33071	Control of Electrical Machines	33074	Control of Electrical Machines Practical
33072	Programmable Logic Controller	33075	Programmable Logic Controller Practical
33073	Electrical Machine Design	33076	Electrical Machine Design practical

VI SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33061	Distribution and utilization	25	75	100	40	3
33053	Electrical Estimation and Energy Auditing	25	75	100	40	3
34052	Micro controller*	25	75	100	40	3
	Elective Theory-II	25	75	100	40	3
33064	Wiring and Winding Practical	25	75	100	50	3
34056	Micro Controller Practical*	25	75	100	50	3
33065	Electrical Circuits Simulation Practical	25	75	100	50	3
	Elective Practical – II	25	75	100	50	3
Total		**200**	**600**	**800**	**360**	

Elective subjects **Any one of the following theory subject with the corresponding practical may be selected as Elective –II**			
Elective Theory – II		**Elective Practical – II**	
33081	Power Electronics	33084	Power Electronics Practical
34082	Bio-Medical Instrumentation	33085	Bio-Medical Instrumentation Practical
34682	Computer Hardware and Networks @	34684	Computer Hardware and Networks Practical @

@ Common with Information Technology

VII SEMESTER

Subject Code	SUBJECT	EXAMINATION MARKS			Minimum for pass	Duration of exam (Hrs)
		Internal Assessment Marks	Board Exam Marks	Total Marks		
33067	Project Work	25	75	100	50	3
33092	In Plant Training	25	75	100	50	3
Total		**50**	**150**	**200**	**80**	

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

ALTERNATIVE SUBJECTS FOR THE L - SCHEME TO THE M – SCHEME

Subject Code	Subject	Subject Code	Subject
III SEMESTER W.E.F. OCT '16			
23031	Electrical Circuit Theory	33031	Electrical Circuit Theory
23032	Electrical Machines - I	33032	Electrical Machines-I
24031	Electronic Devices and Circuits	34031	Electronic Devices and Circuits
23034	Electrical Circuits and Machines Practical	33034	Electrical Circuits and Machines Practical
24034	Electronic Devices and Circuits Practical	34034	Electronic Devices and Circuits Practical
23036	Work Shop Practical	No Alternate Subject	
20001	Computer Applications Practical	30001	Computer Applications Practical
IV SEMESTER W.E.F. APR '17			
23041	Electrical Machines - II	33041	Electrical Machines - II
23042	Measurements and Instruments	33042	Measurements and Instruments
24043	Digital Electronics	34043	Digital Electronics
23044	Transducers and Signal Conditioners	33044	Transducers and Signal Conditioners
23045	Electrical Machines and Instrumentation Practical	33045	Electrical Machines and Instrumentation Practical
24046	Digital Electronics & Linear Integrated Circuits Practical	34046	Integrated Circuits Practical
20002	Communication and Life Skill Practice	30002	Life and Employability Skill Practical
V SEMESTER W.E.F. OCT '17			
23051	Power System – I	33051	Generation Transmission and Switchgear
24052	Micro Controller	34052	Micro Controller
23053	Special Electrical Machines	No Alternate Subject	
23055	Electrical Circuits Simulation Practical	33065	Electrical Circuits Simulation Practical (VI Semester)
24056	Micro Controller Practical	34056	Micro Controller Practical

ELECTIVE THEORY – I		ELECTIVE THEORY – I	
23071	Control of Electrical Machines	33071	Control of Electrical Machines
23072	Programmable Logic Controller	33072	Programmable Logic Controller
23073	Electrical Machine Design	33073	Electrical Machine Design
ELECTIVE PRACTICAL – I		**ELECTIVE PRACTICAL – I**	
23074	Control of Electrical Machines Practical	33074	Control of Electrical Machines Practical
23075	Programmable Logic Controller Practical	33075	Programmable Logic Controller Practical
23076	Electrical Machine Design Practical	33076	Electrical Machine Design Practical
VI SEMESTER W.E.F. APR '18			
23061	Power System – II	33061	Distribution and Utilization
23062	Electrical Estimation and Energy Auditing	33053	Electrical Estimation and Energy Auditing (V Semester)
23064	Wiring and Winding Practical	33064	Wiring and Winding Practical
23065	Computer Aided Electrical Drawing Practical	33055	Computer Aided Electrical Drawing Practical (V Semester)
23067	Project Work	33067	Project Work
ELECTIVE THEORY – II		**ELECTIVE THEORY – II**	
23081	Power Electronics	33081	Power Electronics
23082	Bio-Medical Instrumentation	34082	Bio-Medical Instrumentation
24682	Computer Hardware and Networks	34682	Computer Hardware and Networks
23084	Power Electronics Practical	33084	Power Electronics Practical
23085	Bio – Medical Instrumentation Practical	33085	Bio-Medical Instrumentation Practical
24684	Computer Hardware and Networks Practical	34684	Computer Hardware and Networks Practical

Question paper pattern

Common for all theory subjects

PART A ***- (1 to 8) 5 Questions are to be answered out of 8 questions for 2 marks each.*****(Question No. 8 will be the compulsory question and *can be asked from any one of the units)(From each unit maximum of two 2 marks questions alone can be asked)***

PART B ***- (9 to 16)5 Questions are to be answered out of 8 questions for 3 marks each.*** **(Question No. 16 will be the compulsory question and *can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)***

PART C ***- (17 to 21) Five Questions will be in the Either OR Pattern. Students have to answer these five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question if required)***

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

ELECTRICAL CIRCUIT THEORY

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33031

Semester : III Semester

Subject Title : **ELECTRICAL CIRCUIT THEORY**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ELECTRICAL CIRCUIT THEORY	6	90	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (hours)
I	(a) Electrostatics (b) D C Circuits	14
II	Circuit Theorems	12
III	Single Phase Circuits	13
IV	Resonant Circuits	12
V	Three phase Circuits	12
	Revision and Test	12
	Total	**75**

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 course on the basics of Network Analysis, introduction to network elements and explained all the possible method for finding voltage and current across 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 Kirchhoff's 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 behavior of a circuit.

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

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**(a) ELECTROSTATICS** Electric Flux-Electric Flux Density-electric Field Intensity-electric potential-Coulomb's laws of electrostatics-concept of capacitance - Relationship between Voltage, Charge and capacitance – energy stored in a capacitor – capacitors in series and in parallel – Problems in above topics. **(b) D C CIRCUITS** Basic concepts of current, emf, potential difference, resistivity, temperature coefficient of resistance – Ohm's Law – application of Ohm's law – work, power energy – relationship between electrical, mechanical and thermal units – resistance – series circuits – parallel and Series parallel circuits – Kirchhoff's laws –Problems in the above topics.	14
II	**CIRCUIT THEOREMS** Mesh equations – Nodal equations – star/delta transformations – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem. (Problems in DC circuits only)	12
III	**SINGLE PHASE CIRCUITS** 'j' notations – rectangular and polar coordinates – Sinusoidal voltage and current – instantaneous, peak, average and effective values – form factor and peak factor(derivation for sine wave) – pure resistive, inductive and capacitive circuits – RL,RC, RLC series circuits – impedance – phase angle – phasor diagram – power and power factor – power triangle – apparent power, active and reactive power – parallel circuits(two branches only) - Conductance, susceptance and admittance – problems on	13

	all above topics.	
IV	**RESONANT CIRCUITS** Series resonance – parallel resonance (R,L &C; RL&C only) – quality factor – dynamic resistance – comparison of series and parallel resonance – Problems in the above topics - Applications of resonant circuits	12
V	**THREE PHASE CIRCUITS** Three phase systems-phase sequence –necessity of three phase system–concept of balanced and unbalanced load - balanced star &delta connected loads – relation between line and phase voltages and currents – phasor diagram – three phase power and power factor measurement by single wattmeter and two wattmeter methods – Problems in all above topics.	12

TEXT BOOK

S.No	Name of the Book	Author	Publisher
1	Electric Circuit Theory	Dr.M.Arumugam Dr.N.Premkumaran	Khanna Publishers, New Delhi

REFERENCE BOOKS

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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

ELECTRICAL MACHINES - I

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33032

Semester : III Semester

Subject Title : **ELECTRICAL MACHINES - I**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ELECTRICAL MACHINES - I	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	D C Generators	13
II	D C Motors	13
III	Single Phase Transformers	12
IV	Three Phase Transformers	13
V	Storage Batteries	12
	Revision and test	12
	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 and DC electrical source (battery).
- 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. Know the constructional details & working principles of dc machines and transformers.
2. Evaluate the performance of dc generators, motors & transformers.
3. Decide the suitability of dc generator, motor & transformer for particular purpose.
4. Write the specifications of dc machines & transformers as per requirement.
5. Know the constructional details, working principle, testing and capacity of battery

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**D C GENERATORS** Review of electromagnetic induction – Faraday's laws – Fleming's right hand rule – Principle of operation of D.C. generators – Construction of D.C. generators – Field system– Types of armature windings – Principles of lap and wave windings – EMF equation – Types of D.C. generators – Building up of voltage of D.C. Shunt generators –– No load characteristics of Shunt generator – Determination of critical field resistance – Causes of failure to build-up voltage and remedy – Load characteristics of series and shunt generators – load characteristics of cumulatively and differentially compounded generators – Applications – Problems in above topics – armature reaction – methods of compensating armature reaction – process of commutation – sparking in commutators – methods of improving commutation.	13
II	**D C MOTORS** Principle of operation of D.C. Motors – Fleming's left hand rule – Construction – Back emf – Torque equation – Types of motors – Torque-current, Speed-current, Speed-Torque characteristics of different motors – Speed control of DC motors – Field control and armature control– necessity of Starters– 3 Point and 4 Point starters – losses in D.C. Machines – Testing of D.C. machines - Predetermination of efficiency of motor and generator by Swinburne's test – Problems in above topics – Applications of D.C. Motors.	12
III	**SINGLE PHASE TRANSFORMERS** Principle of operation – Constructional details of core, shell type transformers – coil assembly – EMF Equation – Voltage ratio – Transformer on No load – Transformer on load – Current ratio – Phasor diagram on no load and on load at different power factors – O.C. test, S.C. test – Determination of equivalent circuit constants– Determination of voltage regulation and efficiency – Condition for maximum efficiency – All day efficiency – Problems on the above topics - polarity test– Parallel operation of single phase transformers– Auto transformer – principle – saving of copper – applications.	14

IV	**THREE PHASE TRANSFORMERS** Three phase Transformer construction – Types of connections – Star-star, Star-Delta, Delta-Star, Delta-delta connections – Scott connection - V connection of transformer – Parallel operation of three phase transformers –grouping of transformers– Conditions – Phasing out test – Pairing of transformer - Load sharing of transformers with equal and unequal ratings –Cooling of transformers – Various cooling arrangements – Transformer accessories – conservator – breather – explosion vent – Bucholz relay–ON load and OFF load tap changer – Transformer oil tester – Acidity test -– Earthing – Measurement of earth resistance.	12
V	**STORAGE BATTERIES** Classification of cells –construction – chemical action and physical changes during charging , discharging - internal resistance and specific gravity of lead acid, nickel iron and nickel cadmium cells – indication of fully charged and discharged battery –defects and their remedies – capacity – methods of charging – maintenance – applications.	12

TEXT BOOK

SL.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	A Text Book Of Electrical Technology Volume II	B.L. Theraja	S.Chand & Co.New Delhi
2	Electrical Technology	Edward Hughes	Addision – Wesley International Student Edition

REFERENCE BOOK

SL.NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Elements Of Electrical Engineering	Maria Louis	Prentice - Hall Of India Pvt Ltd
2	Electrical Machines	Nagarath	TMH Publications
3	Electrical Machines	Bhattacharya	TMH Publications

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

ELECTRONIC DEVICES & CIRCUITS

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME

(Implemented from the Academic year 2015 - 2016 onwards)

Course Name : DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

Subject Code : 34031

Semester : III Semester

Subject title : ELECTRONIC DEVICES & CIRCUITS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hrs./ Week	Hrs./ Semester	Internal Assessment	Board Examination	Total	
Electronic Devices and Circuits	6	90	25	75	100	3 Hrs

Topics and allocation of hours

UNIT	TOPIC	TIME (HRS)
I	Semiconductor and Diodes	16
II	Bipolar Junction Transistor	15
III	Transistor oscillators and FET and UJT	17
IV	SCR,DIAC,TRIAC and MOSFET	16
V	Opto Electronic Devices and Wave shaping Circuits	16
	Revision, Tests and Model Exam (3+4+3 Hrs)	10
Total		90

RATIONALE:

Every Electronics Engineer should have sound knowledge about the components used in Electronics Industry. This is vital in R&D Department for chip level troubleshooting. To meet the industrial needs, diploma holders must be taught about the most fundamental subject, Electronic devices and Circuits. 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 following units of syllabus contents, the students must be able to:

- Study the working principle of PN junction diode and transistor
- Understand the working principle of different types of rectifiers, different transistor configurations and differentiate various types of amplifiers
- Study the performance of special devices like UJT, FET
- Study the performance of different transistor oscillators
- Study the performance of SCR, DIAC, and TRIAC
- Study the performance and types of MOSFET
- Study the different modes of operations of MOSFET
- Know the construction and working principle of optoelectronic devices

- Study the performance of solar cell with principle and applications
- Explain the concept of wave shaping circuits
- Study the working principle of clippers and clampers

34031 – ELECTRONIC DEVICES AND CIRCUITS

Unit	Name of the topic	Hrs
1	**Semiconductor and Diodes:** **Semiconductor-**Definition, classification, intrinsic and extrinsic N type & p type – drift current &diffusion current diodes – PN junction diode – forward and Reverse bias characteristics – specification – zener diode construction & working Principle-characteristics - zener break down-avalanche break down- zener Diode as a voltage regulator –applications- specifications **Rectifier** – introduction-classification of rectifiers-half wave rectifier-full wave Rectifier(center tapped, bridge)-(no mathematical equations)-comparison-Applications-filters-C, LC and PI filters	10 6
2	**Bipolar junction Transistor:** **Transistor –** NPN and PNP transistor – operation-transistor as an amplifier-transistor as a switch – transistor biasing – fixed bias, collector base bias, self bias – CB,CE,CC configurations – characteristics - comparison between three configurations in terms of input impedance, output impedance, current gain, voltage gain – classification of amplifiers- RC coupled amplifier – emitter follower and its application – negative feedback Concept, effect of negative feedback – types of negative feedback connections	10 5
3	**Transistor Oscillators and FET and UJT:** **Transistor oscillator** – Classifications – Condition for oscillations (Barkhausen criterion) – General form of LC oscillator – Hartley Oscillator – Colpitts Oscillator – RC Phase shift oscillator- Crystal oscillator. **Field Effect Transistor** – construction – working principle of FET – difference Between FET and BJT – classification of FET – characteristics of FET – Applications – FET amplifier (common source amplifier). **Uni Junction Transistor** – construction – equivalent circuit – operation – Characteristics – UJT as a relaxation oscillator	11 6
4	**SCR, DIAC, TRIAC & MOSFET:** SCR – introduction – working – VI-characteristics -comparison between SCR and transistor – SCR as a switch, controlled rectifier. TRIAC working principle Characteristics – DIAC – characteristics – DIAC as bi-directional switch. MOSFET – types & characteristics of N channel MOSFET and P channel	9 7

	MOSFET- Characteristics of enhancement and depletion mode MOSFET – MOSFET as a switch. Applications of SCR,TRIAC, DIAC and MOSFET.	
5	**Opto Electronics Devices and wave shaping circuits:** Classification of opto electronic devices – symbols, Characteristics, working of LDR, LED, 7 segment LED and LCD– opto coupler - Photo transistor. Clipper, Clamper Circuits and waveforms only – Solar Cell - Principles -Applications. Astable, Monostable and Bi-stable Multivibrators using Transistors -Schmitt Trigger using Transistors.	16
	Revision , Test and Model exam	10

Text Books:

1. Electronics Devices & Circuits by Salivahanan S, N.Suresh Kumar, A.Vallavaraj

   Tata McGraw Publication 3rd Edition 2016

2. Electronics Devices and circuit theory by Boyestad & Nashelsky, PHI , New Delhi 2009

Reference Books:

1. Electronic Principles by Malvino,-Tata McGraw Hill Publication 2010.
2. Electronic Devices & Circuits by Allen Mottershed*An Introduction*, PHI
3. Electronics Devices & Circuits by Jacob Millman and Halkias3rd Edition 2010, Tata McGraw – Hill publication

   Optical Fiber Communication by GerdKeise 5th Edition, Tata McGraw – Hill Publication

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

ELECTRICAL CIRCUIT AND MACHINES PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33034

Semester : III Semester

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

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
ELECTRICAL CIRCUIT AND MACHINES PRACTICAL	5	75	25	75	100	3 hrs

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical Machines I and Electrical Circuit Theory Subjects.

OBJECTIVES

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

- Make the various circuit connections
- 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.
- Various speed control methods of DC motor.

List of Experiments

1. a)Verification of Superposition Theorem with two different DC voltages for a common load.
   b) Verification of Thevenin's Theorem with DC supply.
2. a) Verification of Norton's Theorem with DC supply.
   b) Verification of Maximum Power Transfer Theorem.
3. Measure the power in RLC series circuit. Calculate the power factor and draw the phasor diagram.
4. Construct RLC Circuit for Series Resonance and draw the Frequency versus Impedance curve.
5. No Load and Load characteristics of self-excited DC shunt Generator.
6. Load Characteristics of self-excited DC series Generator.
7. Load Test on DC shunt motor and draw the Performance Curves.
8. Load Test on DC series motor and draw the performance curve.
9. Predetermine the efficiency of DC machine by Swinburn's test.
10. Load Test on DC Compound Motor and draw the performance curve.
11. Speed Control of DC Shunt motor by
    a) Armature control method.
    b) Field control method.
12. Load Test on a Single phase Transformer.
13. Load test on a Three-Phase Transformer.
14. Predetermination the efficiency and regulation of a Single phase Transformer by conducting OC and SC test.
15. Find the equivalent circuit constants of a Single phase Transformer by conducting OC and SC tests.
16. Connect two single phase transformer for parallel operation by conducting Polarity test.

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

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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

Electronic Devices & Circuits Practical

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 34034

Semester : III Semester

Subject Title : **Electronic Devices & Circuits Practical**

TEACHING AND SCHEME OF EXAMINATION:

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
Electronic Devices & Circuits Practical	5	75	25	75	100	3 hrs

ALLOCATION OF MARKS

CIRCUIT DIAGRAM	:	20
CONNECTION	:	25
EXECUTION & HANDLING OF EQUIPMENT	:	15
OUTPUT / RESULT	:	10
VIVA – VOCE	:	05
TOTAL	:	75

EQUIPMENTS REQUIRED:

S.NO	Name of the Equipments	Range	Required Nos.
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.	Computers for simulation Experiments		2
9.	Software - **PSPICE/ multisim / orcad / tina(Any 1)**		

34034 - ELECTRONIC DEVICES AND CIRCUITS PRACTICAL

Note:

1. At least 5 experiments should be constructed using breadboard/soldering

STUDY EXPERIMENT (Not for Examination)

Identify and check the working condition of passive & active components and switches.

List of experiments to be conducted

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 filters.

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 plot the drain characteristics of JFET and find its pinch off voltage.

9. Construct and plot UJT characteristics and find its Ip and Vv.

10. Construct and draw SCR characteristics and find its break over voltage.

11. Construct and plot the DIAC and TRIAC characteristics.

12. Construct and draw the waveforms of positive clipper and clamper.

13. Construct and draw the characteristics of LDR and a photo transistor.

14.Simulate the half wave, full wave and bridge rectifier using the simulation tool like PSPICE/ multisim/orcad/tina

15.Simulate the astable and mono stable multi vibrator using the simulation tool like PSPICE/ multisim/orcad/tina

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

ELECTRICAL WORKSHOP PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33036

Semester : III Semester

Subject Title : **ELECTRICAL WORKSHOP PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester : 15

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
ELECTRICAL WORKSHOP	3	45	25	75	100	3 hrs

RATIONALE

- To impart practical knowledge to the diploma students servicing of domestic appliances.
- This subject is assigned 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.	Multimeter	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**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

III SEMESTER

2015 – 2016 onwards

Computer Application Practical
[Common to all Engineering Branches]

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU.

M- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : For All Branches

Subject Code : 30001

Semester : III

Subject title : COMPUTER APPLICATIONS PRACTICAL

TEACHING & SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Course	Instruction		Examination			
			Max.			Duration
	Hours/ week	Hours/ Semester	Internal Assessment	Board Examination	Total	
COMPUTER APPLICATIONS PRACTICAL	4Hrs	60 Hrs	25	75	100	3Hrs

RATIONALE:

The application of Computer knowledge is essential the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents and presentation of documents with audio visual effects ina computer and produces necessary skills in E- Learning and Chatting tools..

OBJECTIVES:

On completion of the following exercises, the students will be able to

- Use the GUI operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Prepare Power Point presentation with different formats
- Expose E-learning tools and chatting tools
- Analyze the datasheet
- Create and manipulate the database
- Create different types of charts
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratioforpracticalclasses

SYLLABUS
LAB EXERCISES
SECTION – A

GRAPHICAL OPEARTING SYSTEM

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – 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.

WORD PROCESSING

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.

Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

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

DAYS	1	2	3	4	5	6	7	8
MON	← TEST →		**A**: JPP / **B**:RDBMS			CA	RDBMS	TUT
TUE	CA	OOP	CN	RDBMS	**A**: RDBMS / **B**: JPP			
WED	CN	RDBMS	OOP	RDBMS	COMMUNICATION		CN	CA
THU	OOP	**A**: JPP / **B**: RDBMS			CA	RDBMS	CN	OOP
FRI	COMMUNICATION		**A**: RDBMS / **B**: JPP		OOP	CN	RDBMS	CA
SAT	OOPS	RDBMS	CN	CA	---------			

4. 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.
5. 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 'confidential' 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 to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, 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.

7. 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 color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product1	Product2	Product3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – B

DATABASE

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

Exercises

9. 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

10. create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening -Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

Exercises

12. 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.
13. Create a Presentation about our institution or any subject with different slide transition with sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail - Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics .

Most Popular Social Networking Sites : History – Features – Services – Usage of Face book , Twitter and Linkdln.

Transferring data through wifi / bluetooth among different devices.

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. 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.

15. Create a presentation on Google docs. Ask your friend to review it and comment onit. Use "Discussion" option for your discussions on the presentation.

Hardware and Software Requirements

Hardware Requirements:

- Computers – 36Nos
    - Intel Core i3 Processor
    - 500 GB Hard Disk, 2 MB RAM
    - 14” Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

Software Requirement

- Any GUI Operating System
- Open Source Software / MS- Office

1. SemesterEndExamination–75 Marks

Content	Max.Marks
Writing Procedure – One Question from Section A	15
Demonstration	15
Results with Printout	5
Writing Procedure – One Question from Section B	15
Demonstration	15
Results with Printout	5
Viva voce	5
Total	**75MARK**

IV SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

ELECTRICAL MACHINES - II

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33041

Semester : IV Semester

Subject Title : **ELECTRICAL MACHINES - II**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ELECTRICAL MACHINES - II	6	90	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hours)
I	Alternator principles and construction	16
II	Alternator performance and testing	16
III	Three phase induction motor	15
IV	A)Single phase induction motor B) Synchronous motor	16
V	A)Special ac machines B)Special dc machines	15
	Revision and test	12
	Total	**90**

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.
- Student will be able to analyze the characteristics and qualitative parameters of these machines.
- These machines are widely used in industries and for generation of electricity.
- The knowledge gained by the student is useful in the study of technological subjects such as Utilization System, Manufacturing Processes and Testing and Maintenance of Electrical machines.
- The knowledge and skills obtained will be helpful in discharging technical functions such as Supervision, controlling and as R & D technician.

OBJECTIVES

The students should be able to

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

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**ALTERNATOR PRINCIPLES AND CONSTRUCTION** Basic principle of alternators – Types of alternators – Stationary armature rotating field – advantages of rotating field – Construction details of alternator – Salient pole rotor – Cylindrical type rotor – Types of A.C. armature windings – Types of slots – Full pitch and short pitched windings – Phase spread angle and effect of distribution factor – pitch factor – relation between frequency, speed and number of poles – EMF equation – Problems – methods of obtaining sine wave – Critical speed of rotor – Ventilation of turbo alternators – advantages of hydrogen cooling and its precaution – excitation and exciters.	16
II	**ALTERNATOR PERFORMANCE AND TESTING** Load characteristics of alternators – reason for change in terminal voltage –Qualitative treatment of armature reaction for various power factor loads – effective resistance – leakage reactance – synchronous reactance, synchronous impedance – Voltage regulation – Determination of voltage regulation by synchronous impedance method (simple problems)- MMF method – potier method. Necessity and conditions for parallel operation of alternators – synchronizing by dark lamp method, bright lamp method ,dark - bright lamp method and synchroscope method– synchronizing current, synchronizing power and synchronizing torque – load sharing of alternators –infinite bus bar .	16

III	**THREE PHASE INDUCTION MOTOR** Rotating magnetic field – Principle of operation of three phase induction motors – slip and slip frequency – comparison between cage and slip ring induction motors –development of phasor diagram – expression for torque in synchronous watts – slip-torque characteristics – stable and unstable region – no load test and blocked rotor test – development of approximate equivalent circuit – problems on the above topics – simplified circle diagram – determination of maximum torque, slip (problems not required) – starting torque and starting current expression – relationship between starting torque and full load torque – speed control of induction motors. Starters of induction motors – direct on line starter and its merits for cage motors – star delta starter- auto transformer starter -rotor resistance starter – cogging –crawling in induction motor– double cage induction motor-induction generator.	15
IV	**A)SINGLE PHASE INDUCTION MOTOR** single phase induction motors – not self starting – methods of making itself starting – construction, working principle –phasor diagram-slip torque characteristics- split phase motor - capacitor motor - shaded pole motor - repulsion motor - universal motor – operation of three phase motor with single phase supply. **B) SYNCHRONOUS MOTOR** Principle of operation –not self starting – methods of starting–effects of excitation on armature current and power factor– 'V' curve and inverted 'V" curve of synchronous motor – the phenomenon of hunting and prevention of hunting by damper winding – comparison between synchronous motor and three phase induction motor -applications -problems on power factor improvement.	16
V	**A)SPECIAL AC MACHINES** Permanent magnet Synchronous motors – Construction and performance – Advantages – Applications –Synchros – Constructional features – Control Transmitter – Control receiver - Applications of synchros– A.C. Servo motors – Two phase A.C.	15

	Servo motor – Linear induction motor. **B)SPECIAL DC MACHINES** Permanent Magnet D.C. Motor – Construction–Working principle – Speed control – Advantages – Applications – Servo motors – D.C. Servomotors – Stepper motors – Variable reluctance stepper motor – Permanent magnet stepper motor.	

TEXT BOOK

S.No	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	A Text Book Of Electrical Technology -Volume II	B.L. Theraja	S.Chand& Co. New Delhi
2.	Electrical Technology	Edward Hughes	Addision– Wesley International Student Edition

REFERENCE BOOK

S.NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
1.	Performance And Design Of Ac machines	M.G.Say	Pitman Publishing Ltd
2.	Electrical Machines	Nagarath	TMH Publications
3.	Electrical Machines	Bhattacharya	TMH Publications

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

MEASUREMENTS AND INSTRUMENTS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33042

Semester : IV Semester

Subject Title : **MEASUREMENTS AND INSTRUMENTS**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MEASUREMENTS AND INSTRUMENTATION	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	Classification and Characteristics of Instruments	15
II	Measurement of current Voltage and Resistance	15
III	Measurement of Power and Energy	12
IV	Measurement of Power factor Frequency and Phase difference	12
V	Measurement of L,C and waveforms	12
	Revision and Test	09
	Total	**75**

Rationale:

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

Objectives:

- To define basic measurement terms.
- To learn about various operating forces and effects used in instruments.
- To study the construction and working of Moving coil and Moving Iron instruments, CT and PT and electrostatic voltmeter.
- To understand the measurement of resistance using different means.
- To study Single phase and Three phase power measurement using wattmeter.
- To study the construction and working of single phase, three phase energy meter and study about calibration
- To study the construction and working of Power factor meters, and phase sequence indicators.
- To study about the frequency measurement using different types of frequency meters.
- To learn about the measurement of inductance and capacitance using bridges.
- To study about CRO and its applications.

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**Classification and Characteristics of Instruments** General - Definition of Measurement – functions of Measurement system (Indicating, Recording and controlling function) – Applications of measurement systems – classification – Absolute and secondary instruments – Indicating Recording and Integrating Instruments –Analog and Digital – Definition of True value, accuracy, precision, error and error correction – Instrument efficiency – Effects used in instruments – operating forces – Deflecting, controlling and damping forces – constructional details of moving system – Types of Supports - Balancing – Torque weight ratio – control system (spring control and gravity control) Damping systems – Magnets – pointers and scales.	**15**
II	**MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE** Types of Instruments – construction, working and torque equation of moving coil, Moving iron, dynamometer type (Shaded pole) Instruments – Extension of instrument range using shunts and multipliers. (Calculation, requirements and simple problems). Tong tester – Electrostatic voltmeter – Rectifier type instruments – Instruments transformers CT and PT – Testing, Errors and characteristics of CT and PT - Classification of Resistance – measurement using conventional method – (Ammeter – voltmeter method) Measurement of low resistance using Kelvin's Bridge ohmmeter – measurement of Medium resistance using Wheatstone bridge – High resistance using Megger - earth resistance- – using Earth tester – Multimeters.	**15**

III	**MEASUREMENT OF POWER AND ENERGY** Power in D.C and A.C Circuits – watt meters in power measurement – Electrodynamometer type and LPF watt meters – Three phase power measurement using Three phase wattmeter- Reactive power measurement in balanced load. Measurement of Energy in AC circuits – Single phase and Three phase energy meters construction and operation – Errors and Error correction – calibration using RSS meter - Digital Energy meter.	**12**
IV	**MEASUREMENT OF POWER FACTOR, FREQUENCY AND PHASE DIFFERENCE** Power factor meters – single phase and Three phase Electro dynamometer type – construction and working – phase sequence Indicator – phase difference measurement using synchroscope –Trivector meter – Merz price maximum demand Indicator. Frequency measurement – Frequency meter – Weston type – Digital Frequency meter – (Simplified Block diagram	**12**
V	**MEASUREMENT OF L,C AND WAVEFORMS** Measurement of Inductance – Maxwell's Inductance bridge – Andersons bridge – Measurement of capacitance using Schering bridge.CRO – Block diagram – CRT – Applications - Measurements of voltage, frequency and phase difference using CRO - Time base and synchronization – Dural trace CRO – Digital storage oscilloscope – Block diagram	**12**

TEXT BOOK

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

REFERENCE BOOK

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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

DIGITAL ELECTRONICS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 34043

Semester : IV Semester

Subject Title : DIGITAL ELECTRONICS

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			
	Hrs Week	Hrs Semester	Internal Assessment	Board Examination	Total	Duration
Digital Electronics	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION:

UNIT	TOPIC	TIME(HRS)
I	Number System, Boolean Algebra, Logic Gates and Digital Logic Families	13
II	Combinational Logic	13
III	Sequential Logic	13
IV	Memory Devices	12
V	Microprocessor – 8085	12
Revision Test		12
TOTAL		75

RATIONALE:

The subject of Digital Electronics holds applications in all branches of engineering. This subject will impart in depth knowledge of Number systems, Logics of Combinational & Sequential circuits and also about various & recent Memory devices and microprocessor. The concept of Digital Electronics will be implemented in all processor.

OBJECTIVES:

- To understand various Number System.
- To understand basic Boolean postulates and laws.
- 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 history and need of Microprocessor.
- To understand the internal architecture details of 8085 Microprocessor.
- To know the instruction set of 8085
- To understand Interrupt Structure of 8085

34043 DIGITAL ELECTRONICS

DETAILED SYLLABUS

UNIT	NAME OF THE TOPIC	HRS
1	**NUMBER SYSTEM AND BOOLEAN ALGEBRA** Binary, Octal, Decimal, Hexadecimal - Conversion from one to another. Binary codes – BCD code, Gray code, Excess 3 code. Boolean Algebra- Boolean postulates and laws- De-Morgan's theorem- Simplification of Boolean expressions using Karnaugh map (up to 4 variables-pairs, quad, octets)- Don't care conditions and constructing the logic circuits for the Boolean expressions. **LOGIC GATES AND DIGITAL LOGIC FAMILIES:** Gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR - Implementation of logic functions using gates - Realization of gates using universal gates- Simplification of expression using Boolean techniques- Boolean expression for outputs. Digital logic families –Fan in , Fan out, Propagation delay - TTL,CMOS Logics and their characteristics - comparison and applications -Tristate logic.	7 6
2	**COMBINATIONAL CIRCUITS** Arithmetic circuits - Binary – Addition, subtraction, 1's and 2's complement - Signed binary numbers- Half Adder- Full Adder- Half Subtractor - Full Subtractor- Parallel and serial Adders- BCD adder. Encoder and decoder – 3 to 8 decoder, BCD to seven segment decoder- Multiplexer- basic 2 to 1 MUX, 4 to 1 MUX, 8 to 1 MUX - applications of the MUX – Demultiplexer - 1 to 2 demultiplexer, 1 to 4 demultiplexer, 1 to 8 demultiplexer - Parity Checker and generator.	7 6
3	**SEQUENTIAL CIRCUITS** FLIP FLOPS – SR, JK, T, D FF, JK- MS FF - Triggering of FF – edge & level , Counters – 4 bit Up - Down Asynchronous / ripple counter - Decade counter- Mod 3, Mod 7 counter. 4 bit Synchronous Up - Down counter - Johnson counter, Ring counter **REGISTERS** 4-bit shift register- Serial IN Serial OUT- Serial IN Parallel OUT - Parallel IN Serial OUT- Parallel IN Parallel OUT	7 6
4	**MEMORY DEVICES** Classification of memories - RAM organization - Address Lines and Memory Size- Read /write operations- Static RAM - Bipolar RAM cell- Dynamic RAM- SD RAM- DDR RAM. Read only memory – ROM organization- Expanding memory- PROM- EPROM- and EEPROM - Flash memory- Anti Fuse Technologies.	12

5	**MICROPROCESSOR – 8085** Evolution of microprocessor 8085 – Architecture of 8085- Instruction sets- Addressing modes - Memory mapped I/O and I/O mapped I/O and its Comparison. Machine cycle – Opcode fetch - memory read- memory write- I/O read, I/O write - Instruction cycle (Timing diagram) for MOV r1, r2 instruction. Interrupts (types & Priorities)	**12**
	Revision & Test	**12**

REFERENCE BOOKS:

SL.No	Title	Author	Publisher with Edition
1.	Principles of Digital Electronics	K.Meena	PHI – 2011
2.	Modern Digital Electronics	R.P.Jains	TMH -2003
3.	Microprocessor architecture programming and application	Ramesh S. Gaonkar,	Wiley Eastern Limited.
4.	Digital principles & Applications	Albert Paul Malvino & Donald P.Leach	TMH - 4th Edition 2002
5.	Digital Electronics	William H.Gothmann	prentice Hall of India – 2nd Edition ,1995
6.	Introduction to Microprocessor	Aditya P Mathur	Tata McGraw-Hil publishing Company Limited
7.	Digital Electronics	Roger L.Tokheim Macmillan	McGraw hill -1994
8.	Digital Electronics- an introduction to theory and practice	William H.Gothmann	PHI 1998

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

TRANSDUCERS AND SIGNAL CONDITIONERS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33044

Semester : IV Semester

Subject Title : **TRANSDUCERS AND SIGNAL CONDITIONERS**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
TRANSDUCERS AND SIGNAL CONDITIONERS	4	60	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hours)
I	Classification and Sensing elements	09
II	Passive Transducers	09
III	Active Transducers	09
IV	Operational amplifiers	11
V	Signal conditioners in Industrial Instrumentation	10
	Revision and Test	12
	Total	**60**

RATIONALE

Sensors and transducers are used in automation in construction, domestic appliances industries, transport, space exploration, defense equipment, health services and other applications. Transducers have achieved substantial accuracy and control in Industrial automation; Transducers lie at the heart of instrumentation. Hence it becomes imperative to study about the principles and applications of various types of transducers in a single volume in Diploma level.

OBJECTIVES

- To understand the necessity and advantages of transducer.
- To learn about different types of transducers.
- To study the principle of working of resistive type passive transducers and it's applications.
- To learn the operation and applications of capacitive and inductive transducer.
- To learn about various active transducers and their applications.
- To understand the concept of Digital encoding transducers.
- To know the concept of signal conditioning using op.amp
- To study the characteristics and various applications of op.amp.
- To understand the use of signal conditioners in Instrumentation.
- To learn about the selected applications of op.amp in Industrial Instrumentation.

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**CLASSIFICATION AND SENSING ELEMENTS** General – Definition - Necessity - Types - classification based on the principle of operation - Active and passive - Primary and Secondary - Examples in each - Advantages - Primary sensing elements - Bourdon tubes. Bellows – Load cells – Thermistors –Types – construction and operation of Metal Resistance thermometer – Digital encoding transducer	09
II	**PASSIVE TRANSDUCERS** Resistive Transducer - Strain Gauge - construction and working of Strain gauge - Strain gauge in measurement of displacement - Capacitive transducer and its applications – Liquid level measurement using capacitive transducers – Inductive transducer - Basic structure - proximity sensor - Measurement of pressure using inductive transducer - Construction and operation of LVDT, RVDT.	09
III	**ACTIVE TRANSDUCERS** Thermocouple - construction and principle - Measurement of angular velocity using Tachogenerator - Piezoelectric transducers - principle - measurement of pressure and vibrations - Hall effect Transducer - photo voltaic transducers (solar cell) - photo conductive transducer Measurement of radiation using Geiger Muller tube.	09
IV	**OPERATIONAL AMPLIFIERS** Block diagram - DC, AC signal conditioning – operational amplifiers IC 741 – Pin details – Important terms – characteristics of Ideal op amp - inverting and Non inverting mode –Gain – Applications of op. amps - Adders, Subtractor, Scale charger, integrator, Differentiator, Voltage to current converter - current to voltage converters - Differential amplifiers - Comparators (inverting and non-inverting).	11

V	**SIGNAL CONDITIONERS IN INDUSTRIAL INSTRUMENTATION** Operational amplifier with capacitive transducer – Operational amplifier as Instrumentation amplifiers – Bridge amplifier – active filters using op.amp - LPF, HPF – LPF as integrator - HPF as differentiator - Clipper, Clamper using op.amp. Successive approximation ADC - R - 2R ladder network DAC - wein bridge oscillator using op.amp - op. amp as Zero crossing Detector	10

TEXT BOOK

S.No	Title	Author	Publishers
1.	Transducers and Instrumentation	DVS Murty	PHI 2009

REFERENCE BOOK

S.No	Title	Author	Publishers
1.	Sensor and Transducers	D. Patranabis	PHI 2011
2.	A Course in Electrical and Electronics Measurements and Instrumentation.	1.A.K. Sawhney 2.Puneet Sawhney	Dhanpat Rai & Co (P) Ltd., New Delhi 1993
3.	Measurement and Instrumentation	Arun. K	PHI 2010
4.	Operational Amplifiers and Linear Integrated Circuits	1.Robert F. Coughlin 2.Frederick F. Driscoll	PHI 1992
5.	Op. amp & Linear Integrated Circuits	Ramakant. A. Gayakwad	PHI 1992

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33045

Semester : IV Semester

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

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ELECTRICAL MACHINES AND INSTRUMENTATION PRACTICAL	5	75	25	75	100	3 hrs

RATIONALE

- To impart practical knowledge to the diploma students, practical subjects are introduced for every corresponding theory subject.
- This practical supports the aim and objective of Electrical Machines II and Measurements and Instruments subjects.

OBJECTIVES

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

- Understand the characteristics of AC machines.
- Make various electrical measurements.
- Use transducers in non electrical quantity measurement

LIST OF EXPERIMENTS

1. Predetermine the regulation of alternator.
2. Load test on 3 phase alternator.
3. Synchronisation of 3Φ alternators.
4. Load test on 1 phase induction motor.
5. Load test on 3 phase induction motor.
6. Determine the equivalent circuit constants of 3 phase induction motor.
7. Predetermine the performance of a 3 phase induction motor.
8. Improvement of power factor of an induction motor with load.
9. Calibration of given ammeter and voltmeter.
10. Calibration of given wattmeter.
11. Calibration of 3 phase energy meter.
12. Measurement of alternator winding resistance using Wheatstone bridge
13. Measurement of value of unknown capacitance using Schering Bridge.
14. Measurement of value of unknown inductance using Anderson Bridge.
15. Displacement measurement using LVDT.
16. Measurement of earth resistance by using megger.

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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015-2016 onwards

INTEGRATED CIRCUITS PRATICAL

CURRICULAM DEVELOPMENT CENTRE

M-SCHEME

(Implemented from the Academic year 2015-2016 onwards)

Course Name: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

Subject code : 34046

Semester : IV Semester

Subject title : INTEGRATED CIRCUITS PRACTICAL

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hrs/ week	Hrs/ semester	INTERNAL ASSESMENT	BOARD EXAM	TOTAL	
Integrated Circuits Practical	5	75	25	75	100	3Hrs

ALLOCATION OF MARKS

CIRCUIT DIAGRAM :	20
CONNECTION :	25
EXECUTION & HANDLING OF EQUIPMENT :	15
OUTPUT / RESULT :	10
VIVA – VOCE :	05
TOTAL :	75

34046 - INTEGRATED CIRCUITS PRACTICAL

List of experiments

Note: At least 5 experiments should be constructed using breadboard

1. Verification of truth table of OR, AND, NOT, NOR, NAND, EX-OR gates.
2. Realization of basic gates using NAND & NOR gates.
3. Realization of logic circuit for a given Boolean expression.
4. Half adder, Full adder using IC's.
5. Half subtractor, full subtractor using IC's.
6. Construction and verification of truth table for Decoder/Encoder.
7. Multiplexer/De-multiplexer using multiplexer IC's.
8. Parity generator and checker using parity checker/ generator IC's.
9. Construction and verification of truth table for RS, D, T & JK flip-flop.
10. 4- bit ripple counter using FF
11. Construct a Single digit Decade Counter with 7 segment display.
12. Astable Multi vibrator using IC 555.
13. Simulate the Clippers and clampers using the simulation tool like PSPICE/ multisim/orcad/tina.
14. 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.
15. 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.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

II YEAR

M SCHEME

IV SEMESTER

2015 – 2016 onwards

LIFE AND EMPLOYABILITY SKILL PRACTICAL [COMMON TO ALL ENGINEERING BRANCHES]

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING – SYLLABUS – M Scheme

(Being implemented from the Academic Year 2016-2017 onwards)

Course Name : **All Branches of Diploma in Engineering and Technology and Special Programmes**

Subject Code : **30002**

Semester : **IV /V**

Subject Title : **LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

Teaching and Scheme of Examination: **No. of Weeks per Semester: 15 Weeks**

Subject	Instruction		Examination			
			Marks			
	Hours/ Week	Hours/ Semester	Internal assessment	Board Examination	Total	Duration
Life and Employability Skills	4 Hours	60 Hours	25	75	100	3 Hours

Topics and Allocation of Hours:

Sl. No.	Section	No. of Hours
1	**Part – A** Communication	**30**
2	**Part – B** Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools& Labour Welfare	**20**
3	**Part – C** Environment, Global Warming, Pollution	**10**
TOTAL		**60**

RATIONALE

Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

SPECIFIC INSTRUCTIONAL OBJECTIVES

1. Emphasize and Enhance Speaking Skills

2. Increase Ability to Express Views & Opinions

3. Develop and Enhance Employability Skills

4. Induce Entrepreneurship and Plan for the Future

5. Expose & Induce Life Skills for Effective Managerial Ability

LIFE AND EMPLOYABILITY SKILLS PRACTICAL

SYLLABUS

Unit	Topics	Activity	Hours
I	**Communication, Listening, Training, Facing Interviews, Behavioural Skills**	-- instant sentence making – say expressions/phrases-- self- introduction/another higher official in company – describe/explain product – frame questions based on patterns – make sentences based on patterns	**30**
II	**Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement**	-- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur – prepare a resume	**10**
III	**Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping**	-- search in the website -- prepare a presentation – discuss & interact	**05**
IV	**Occupational Safety, Health Hazard, Accident & Safety, First-Aid,Labour Welfare Legislation, Welfare Acts**	-- search in the website -- prepare a presentation – discuss & interact	**05**
V	**Environment, Global Warming, Pollution**	-- taking down notes / hints – answering questions -- fill in blanks 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 blanks with exact words heard) **05**

b) Speaking Extempore/ Prepared **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**
3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**

c) Writing & Reading **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare 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 **10 Marks**
Other activities recorded in the Record note **10 Marks**
Attendance **05 Marks**

INTERNAL MARKS **25 MARKS**

EXTERNAL MARKS AT 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 the exact words heard. 05

B. SPEAKING **30 Marks**

1. Say in a sentence instantly on hearing the word(5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department.
   Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	
d.	These	are	the new products	launched	by our company
e.	Almost everyone	come	to the company	on motorbikes	

3. Prepare a resume for 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 are to be taken.
These topics are common for all the three types of evaluation.

B. SPEAKING :

1. WORDS of common usage
2. Fragments – expression of politeness, courtesy, cordiality
3. Introduce yourself as an engineer with designation or
   Introduce the official visiting your company/department

4. Describe/Explain the product/machine/department
5. Dialogue must be with someone in the place of work.
6. Group of six/eight
   Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

1. Provide five different structures.
   Students are to substitute at least one with some other word/words
2. Provide five different structures.
   Students are to substitute at least one 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
   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. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness
3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship

10. Marketing Analysis, Support and Procurement

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 – 29")
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 – 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 – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

GENERATION, TRANSMISSION AND SWITCHGEAR

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33051

Semester : V Semester

Subject Title : **GENERATION, TRANSMISSION AND SWITCHGEAR**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
GENERATION, TRANSMISSION AND SWITCHGEAR	6	90	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hrs)
I	Generation Of Electrical Power	16
II	A.C. And H.V.D.C Transmission	16
III	Line Insulators And Underground Cables	15
IV	Circuit Breakers And Over Voltage Protection	16
V	Protective Relays And Grounding	15
	Revision and Tests	12
	TOTAL	**90**

RATIONALE

Energy is the basic necessity for the economic development of a country. As a matter of fact, there is a close relationship between the energy used per person and his standard of living. The greater the per capita consumption of energy in a country, the higher is the standard of living of its people. The modern society is so much dependent upon the use of electrical energy that it has become a part of our life. So to have adequate knowledge in Electrical power generation and transmission it becomes necessary to include this subject.

OBJECTIVES

To Understand

- Conventional power plants-Layout and choice of site
- 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

DETAILLED SYALLABUS
CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**GENERATION OF ELECTRICAL POWER** Introduction- Conventional methods of power generations – 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, Pumped storage schemes-Advantages and Disadvantages- Renewable Energy sources-Basic principle of Solar Energy, Grid Connected Solar PV System, Standalone Solar PV System, Hybrid Solar PV System, Wind Power Generation. 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-Tariff – Types- Factors influencing tariff, Simple problems - Load sharing between base load and peak load plants-Load Dispatching centre stand-alone system.	16
II	**A.C. AND H.V.D.C 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- High Transmission Voltage-Advantages-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- Problems- Effect of wind and ice loading over the line conductor (Qualitative treatment only) - constants of a Transmission line- Transposition of Transmission lines-Skin Effect- Ferranti Effect-Corona formation and corona loss-Factors affecting corona-Advantages and Disadvantages-Classification of O.H. Transmission lines- performance of single phase short Transmission line - voltage regulation and Transmission Efficiency-Problems. **H.V.D.C Transmission:** Advantages and Disadvantages of D.C Transmission-Layout Scheme and principle of High Voltage D.C Transmission-D.C link configurations (monopolar, Bipolar and Homopolar)-HVDC convertor Station	16

	(Schematic diagram only)	
III	**LINE INSULATORS AND UNDERGROUND CABLES** **Line Insulators:** Introduction - Line Insulator materials-Properties of Insulators-Types & causes of failure of Insulators-Testing of Insulators-Potential Distribution over suspension Insulator string-String Efficiency - Methods of improving string efficiency- problems. **Underground cables:** Introduction-Advantages and requirement of cables-construction- of a three core cable-Insulating materials for cables-properties of Insulating materials used in cables-classification of cables-cables for three phase service-construction of Belted cable, screened cable, Pressure cables-Laying of underground cables-Direct laying, Drawing system, Advantages and Disadvantages-Grading of cables- capacitance grading, Inter sheath grading (No derivation and Problems)-cable faults-O.C, S.C and Earth faults.	15
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 – Breaking capacity, making capacity, short time rating - Auto reclosing in circuit Breakers - Classification of Circuit Breakers – Construction and Working principle of Oil Circuit Breaker, Air blast Circuit Breaker, E.L.C.B, Miniature circuit breaker (M.C.B) , Residual current circuit breaker , SF6 and vacuum Circuit Breaker D.C breaking -Problems of D.C breaking-Schematic for HVDC CB 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-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.	16

V	**PROTECTIVE RELAYS AND GROUNDING** **Protective relays:** Basic principled-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 **Grounding:** Introduction-Equipment grounding- system grounding- ungrounded grounding, Resistance grounding Reactance grounding, resonant Neutral system-Necessity of Neutral grounding -methods-solid grounding-Earthing Transformer.	15

TEXT BOOK

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

REFERENCE BOOK

Sl. No	Name of the Book	Author	Publisher	Edition
1	Electrical Power System	CLWadhawa	New Age International, New Delhi	Fourth Edition, 2009
2	A Course in Electrical Power	Soni, Gupta	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	Kaison Publishing House	Reprint 2004
5	HVDC Power Transmission System & Technology	KR. Padiyar	New Age International, New Delhi	Reprint 2005
6	Digital Protection – Protective Relaying from Electromechanical to Microprocessor	LP Singh	New Age International	Second Edition 1997
7	Power System Protection and Switchgear	B Ram & DN Viswakarma	TMH 1995	Reprint 2000

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

MICROCONTROLLER

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M – SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject code : 34052

Semester : V Semester

Subject title : MICROCONTROLLER

TEACHING AND SCHEME OFEXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
	Hrs./ Week	Hrs./ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MICROCONTROLLER	6	90	25	75	100	3 Hrs

TOPICS AND ALLOCATION:

Unit	Topic	Time (Hrs.)
I	Architecture & Instruction set of 8051	19
II	Programming Examples	13
III	I/O and Timer	15
IV	Interrupt and Serial Communication	16
V	Interfacing Techniques	19
	Revision - Test	8
	TOTAL	75

RATIONALE:

The exponential growth of Engineering and Technology has benefited the mankind with

extreme sophistication and comfort. To sustain this development, continuous research and

development should take place not only in Engineering and Technology but also in Basic Science

such as Physics.

The various divisions of Physics like Optics, Acoustics, Dynamics, Semiconductor Physics,

Surface Physics, Nuclear Physics, Energy Studies, Materials Science, etc provide the Foundation

by enlightening the Fundamental facts, Principles, Laws and Correct sequence of events to

develop the Engineering and Technology field for the prosperity of human beings.

OBJECTIVES:

- On completion of the following units of syllabus contents, the students must be able to
- Explain Architecture of 8051 Microcontroller.
- Explain the functions of various registers.
- Understand interrupt structure of 8051.
- Understand serial data communication concepts.
- Understand the programming techniques.
- Explain various addressing modes.
- Write simple programs using 8051.
- Understand the block diagram and control word formats for peripheral devices.
- Understand how to interface with RS232C.
- Understand how to interface with 8255.
- Understand various application of 8051 Microcontroller

34052-MICROCONTROLLER

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**ARCHITECTURE & INSTRUCTION SET OF 8051** **1.1 ARCHITECTURE OF 8051** Comparison of Microprocessor and Microcontroller - Block diagram ofMicrocontroller –Functions of each block - Pin details of 8051 – ALU –ROM– RAM – Memory Organization of 8051 - Special function registers –Program Counter – PSW register – Stack - I/O Ports – Timer – Interrupt – Serial Port – Oscillator and Clock - Clock Cycle – State - Machine Cycle –Instruction cycle – Reset – Power on Reset – Overview of 8051 family **1.2 INSTRUCTION SET OF 8051** Instruction set of 8051 – Classification of 8051 Instructions - Data transfer instructions – Arithmetic Instructions – Logical instructions –Branching instructions – Bit Manipulation Instructions	19
II	**PROGRAMMING EXAMPLES:** **2.1 ASSEMBLER AND ADDRESSING MODES** Assembling and running an 8051 program –Structure of Assembly Language –Assembler directives - Different addressing modes of 8051 **2.2 PROGRAMMES** Multibyte Addition – 8 Bit Multiplication and Division – Biggest Number / Smallest Number – Ascending order / Descending order BCD to ASCII Conversion – ASCII to Binary Conversion – Odd Parity Generator – Even Parity Generator -Time delay routines	13

III	**I/O AND TIMER:** **3.1 I/O** Bit addresses for I/O and RAM – I/O programming – I/O bitmanipulation programming. **3.2 TIMER** Programming 8051 Timers – Timer 0 and Timer 1 registers – Differentmodes of Timer – Mode 0 Programming – Mode 1 Programming - Mode 2Programming - Counter programming – Different modes of Counter – Mode 0 Programming – Mode 1 Programming -Mode 2 Programming (simple programs)	15
IV	**INTERRUPT AND SERIAL COMMUNICATION** **4.1 SERIAL COMMUNICATION** Basics of Serial programming – RS 232 Standards - 8051 connection to RS 232 – 8051 Serial Communication Programming – Programming 8051 to transmit data serially - Programming 8051 to Receive data serially. **4.2 INTERRUPT** 8051 Interrupt s – Programming Timer Interrupts – Programming external hardware interrupts – Programming the serial communication interrupt –Interrupt priority in 8051 (simple programs).	16
V	**INTERFACING TECHNIQUES** **5.1. IC 8255** IC 8255 – Block Diagram – Modes of 8255. **5.2. INTERFACING TECHNIQUES** Interfacing external memory to 8051– 8051 interfacing with the 8255 – ASM Programming – Relays – Sensor interfacing – ADC interfacing – DAC interfacing - Keyboard interfacing – Seven segment LED Display Interfacing - Stepper Motor interfacing – DC motor interfacing using PWM	19
Revision & Test		**10**

TEXT BOOKS:

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

REFERENCE BOOKS:

- 8051 Microcontroller and Embedded Systems using Assembly and C by Mazidi,Mazidi and D.MacKinlay, 2006 Pearson Education Low Price Edition.
- Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

ELECTRICAL ESTIMATION AND ENERGY AUDITING

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33053

Semester : V Semester

Subject Title : **ELECTRICAL ESTIMATION AND ENERGY AUDITING**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
ELECTRICAL ESTIMATION AND ENERGY AUDITING	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hrs)
I	Systems Of Internal Wiring And Earthing	14
II	Domestic and Industrial Estimate	12
III	Energy Management & Audit	13
IV	Electric Motors & Lighting System	12
V	Diesel Generating System & Energy Efficient Technologies In Electrical Systems	12
	Revision And Tests	12
	TOTAL	**75**

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 costs) and enhance competitive positions, it is necessary to conserve energy. Hence it is necessary to study energy auditing methods and energy saving opportunities in electrical system.

OBJECTIVES:

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 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

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**SYSTEMS OF INTERNAL WIRING AND EARTHING** Need of electrical symbols – List of symbols – Brief study of important Indian Electricity Rules 1956 - Methods of representation for wiring diagrams – Looping back system and Joint box system and tree system of wiring - Types of internal wiring – Service connection (Overhead and Underground) - Protection of electrical installation against overload, short circuit and earth fault – protection against electric shock – Effects of electric shock – Recommended first aid for electric shock - Treatment for electric shock - Construction and working of ELCB – Overview of Busbar Trunking and Cable tray. Necessity – General requirements of Earthing – Earthing and Soil Resistivity – Earth electrodes – Methods of earthing - Plate earthing - Pipe earthing - Rod earthing – Soil Resistivity – Methods of improving earth resistance - Size of earth continuity conductor - Difference between Neutral and Earth Wires. Safety signs showing type of PPE to be worn, Prohibition Signs, Warning Signs, Mandatory Signs, Advisory or Safe Condition Signs.	14
II	**DOMESTIC AND INDUSTRIAL ESTIMATE** General requirements of electrical installations for Residential, Commercial and Industrial – Lighting and power sub-circuits – Diversity factor for sub circuits - Location of outlets, control switches, main board and distribution boards – Permissible voltage drops and size of wires - Steps to be followed in preparing electrical estimate. Estimate the quantity of material required in Electrical Installation for 1. Small residential building/Flat 2. Factory Lighting scheme 3. Computer centre having 10 computers, a/c unit, UPS, light and fan. 4. Street Light service having 12 lamp light fitting 5. Workshop with one number of 3Φ, 15hp induction motor. 6. Small Workshop with 3 or 4 Machines.	12

III	**ENERGY MANAGEMENT & AUDIT AND ELECTRICAL SYSTEM:** **Energy Management & Audit** Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach- Understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution, Energy audit Instruments. **Electrical system:** Electricity billing, Electrical load management and maximum demand control, Power factor improvement and its benefit, Selection and location of capacitors, Performance assessment of PF capacitors, Distribution and transformer losses.	13
IV	**ELECTRIC MOTORS & LIGHTING SYSTEM** **Electric motors** Types, Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, Energy saving opportunities with energy efficient motors. **Lighting System** Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues.	12
V	**DIESEL GENERATING SYSTEM & ENERGY EFFICIENT TECHNOLOGIES IN ELECTRICAL SYSTEMS** **Diesel Generating system** Factors affecting selection, Energy performance assessment of diesel conservation avenues. **Energy Efficient Technologies in Electrical Systems:** Maximum demand controllers, Automatic power factor controllers, Energy efficient motors, Soft starters with energy saver, Variable speed drives, Energy efficient transformers, Electronic ballast, Occupancy sensors, Energy efficient lighting controls, Energy saving potential of each technology.	12

TEXT BOOK

S.No	TITLE	AUTHOR(S)	PUBLISHERS	EDITION
1	Electrical Design Estimating And Costing	K.B.Raina& S.K.Battacharya	New age International Ltd	Reprint - 2011
2	Book 1 - General Aspect Of Energy Management And Energy Audit	-	Bureau of energy efficiency, new Delhi	Second-2005
3	Book 3 - Energy Efficiency In Electrical Utilities	-	Bureau of energy efficiency, new Delhi	Second-2005

REFERENCE BOOK

S.No	TITLE	AUTHOR(S)	PUBLISHERS	EDITION
1	Electrical Wiring, Estimating and Costing	Dr.S.L.Uppal G.C. Garg	Khanna publishers.	Sixth-2011
2	Electrical Estimation and Costing	Surjit Singh	Khanna publishers.	
3	Energy Auditing in Electrical Utilities	Rajiv Shankar	Viva Books - 2010	
4	Energy engineering and Management	Amlan Chakrabarti	PHI Learning Pvt Ltd - 2011	

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

CONTROL OF ELECTRICAL MACHINES

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33071

Semester : V Semester

Subject Title : **CONTROL OF ELECTRICAL MACHINES**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
CONTROL OF ELECTRICAL MACHINES	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	Control circuit components	13
II	AC motor control circuits	12
III	Industrial control circuits	13
IV	Programmable Logic Controller	13
V	PLC Programming	12
	Revision and test	12
	Total	**75**

RATIONALE

Various control operations are to be performed on the electrical machines to suit the industrial requirements. Technician is mainly employed to look after the control panels. To make our students employable, they have to be trained in using various control components and circuits. This subject fulfils that requirement.

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.
- PLC Programming.

DETAILED SYALLABUS

CONTENTS

UNIT	NAME OF THE TOPIC	HOURS
I	**Control circuit components** Switches – Push button, selector, drum, limit, pressure, temperature (Thermostat), float, zero speed and proximity switches. Relays – Voltage relay, DC series current relay, frequency response relay, latching relay and phase failure relay (single phasing preventer). Over current relay – Bimetallic thermal over load relay and Magnetic dash pot oil filled relay. Timer – Thermal Pneumatic and Electronic timer. Solenoid Valve, Solenoid type contactor (Air break contactor), Solid state relay, Simple ON-OFF motor control circuit, Remote control operation and interlocking of drives.	14
II	**AC motor control circuits** Motor current at start and during acceleration – No load speed and final speed of motor – DOL starter – Automatic auto transformer starter (open circuit and closed circuit transition) – Star/Delta starter (semi automatic and automatic) – Starter for two speed two winding motor – Reversing the direction of rotation of induction motor – Dynamic Braking – Three step rotor resistance starter for wound induction motor – Secondary frequency acceleration starter.	13
III	**Industrial control circuits** Planner machine control – Skip hoist control – Automatic control of a water pump – Control of electric oven – Control of air compressor – Control of over head crane – control of conveyor system – Control of elevator - Trouble spots in control circuits – General procedure for trouble shooting.	14
IV	**Programmable Logic Controller** Automation – Types of automation (manufacturing and non-manufacturing) – advantages of automation –PLC Introduction – Block diagram of PLC – principle of operation – modes of operation – PLC scan – memory organization – input module (schematic and wiring	14

	diagram) – output module (schematic and wiring diagram) – Types of Programming Devices – Comparison between hardwire control system and PLC System –PLC Types (Fixed and Modular) – Input Types – Output Types – Criteria for selection of suitable PLC – List of various PLCs available.	
V	**PLC PROGRAMMING** Different programming languages – ladder diagram – Relay type instruction – Timer instruction – ON delay and OFF delay Timer – Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter – Down Counter – UP/DOWN Counter - ladder logic diagram for DOL Starter, Automatic STAR-DELTA Starter -rotor resistance starter and EB to Generator changeover system.	**13**

TEXT BOOK

S.No.	Name of the Book	Author	Publisher
1.	Control of Electrical Machines.	S.K. Bhattacharya	New Age International Publishers, New Delhi
2.	Explosing Programmable Logic controllers with Application.	Pradeep Kumar Srivastava.	BPB Publications

REFERENCE BOOK

S.No.	Name of the Book	Author	Publisher
1.	Industrial motor control.	Stephen Herman	6th Edition, Cengage Learning.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

PROGRAMMABLE LOGIC CONTROLLER

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33072

Semester : V Semester

Subject Title : **PROGRAMMABLE LOGIC CONTROLLER**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROGRAMMABLE LOGIC CONTROLLER	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	TIME (Hrs)
I	Introduction To Plc	12
II	Input / Output Modules	13
III	Plc Programming	14
IV	Networking	12
V	Data Acquisition Systems	12
	Revision And Tests	12
	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:

Unit: 1

After completing this chapter, students should able to:

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

Unit: 2

After completing this chapter, students should able to:

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

Unit: 3

After completing this chapter, students should able to:

- ✓ Describe PLC timer instruction and differentiate between a non-retentive and retentive timer
- ✓ Program the control of outputs using the timer instruction
- ✓ List and describe the functions of PLC counter instructions
- ✓ Create PLC programs involving program control instructions, math instructions

Unit: 4

After completing this chapter, students should able to:

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

Unit: 5

After completing this chapter, students should able to:

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

DETAILED SYLLABUS
CONTENTS

UNIT	NAME OF THE TOPIC	HOURS
I	**INTRODUCTION TO PLC:** Automation – Types of Automation (manufacturing and Non-Manufacturing) – Advantages of automation - PLC Introduction - Definition – Block diagram of PLC – Principle of operation –Modes of operating – PLC Scan - Hardwire control system compared with PLC system - Advantages and Disadvantages of PLCs – Criteria for selection of suitable PLC –Memory organization – Input Types – Discrete input – Analog in/out - Elements of Power supply unit - PLC Types (Fixed I/O and Modular I/O) - List of various PLCs available – Applications of PLC.	13
II	**INPUT/OUTPUT MODULES** The I/O Section - Discrete I/O modules(DC and AC) – Analog I/O modules - Special I/O Modules– I/O Module Specification - Typical Discrete and Analog I/O field Devices –Sensors – Limit switch – Reed switch – Proximity sensor (Inductive and Capacitive) – Types of Photo Electric Sensor - Sinking and Sourcing I/O modules–TTL output module – Relay output module –Isolated output module - Input/output Addressing scheme in important commercial PLCs.	14
III	**PLC PROGRAMMING** Types of programming methods – Types of programming devices – Logic Functions – AND Logic – OR Logic – NOT Logic - Relay type instructions –Timer Instructions – ON Delay and OFF Delay Timer – Retentive Timer Instruction – Cascading Timers – Counter Instruction – UP Counter – DOWN Counter – UP/DOWN Counter – Cascading Counters – Program Control Instructions –Data Manipulation Instruction – Data Compare Instructions – Math Instructions - Sequencer Instructions - PID Instruction – PWM Function – Simple programs using above instructions. Develop ladder logic for: Bottle filling system – Automatic car parking system - EB to Generator Changeover system – Batch process – Elevator system - Automatic Star-Delta Starter – Traffic light control.	15
IV	**NETWORKING** Levels of industrial network – Network Topology –Network Protocol – OSI Reference Model - Networking with TCP / IP Protocol - I/O Bus networks – Block diagram of I/O Bus networks – Types of I/O Bus networks - Protocol standards – Advantages of I/O Bus networks - Gateway – Token passing – Data Highway – Serial Communication – DeviceNet – ControlNet – EtherNet – Modbus – Fieldbus – Profibus-Subnetting – Subnet mask - File transfer protocol.	13

V	**DATA ACQUISITION SYSTEMS** Computers in Process control – Types of processes - Structure of control system – ON/OFF Control – Closed loop control - PID Control – Motion Control –Block diagram of Direct Digital Control - Supervisory Control and Data Acquisition (SCADA)–Block diagram of SCADA – Features of SCADA – Functions of SCADA - SCADA software - Data Loggers – Tags – Alarms - landlines for SCADA – use of modems in SCADA.	13

TEXT BOOK

Sl.No.	Title	Author(s)	Publishers
1	Introduction to Programmable Logic Controllers	Gary Dunning	CengageLearning India Pvt Ltd – Third Edition 2011
2	Technician's Guide to Programmable Logic Controllers	Richard A. Cox	Delmer – Sixth Edition 2011
3	Programmable Logic Controllers – Principle and Applications	John W. Webb	Prentice Hall
4	Programmable Logic Controllers – Programming Methods and Applications	John R Hackworth and Fredrick D. Hackworth	Pearson Education
5	Programmable Logic Controllers	W. Bolton	Newness
	Programmable Controller Theory and Implementation	L.A.Bryan E.A.Bryan	An Industrial Text Company Publication – Second Edition 1997

REFERENCE BOOK

SL.NO.	**TITLE**	**AUTHOR(S)**	**PUBLISHERS**
1.	Programmable Logic Controllers	Frank D.Petruzella	Tata McGraw Hill Edition-Fourth Edition 2011
2.	Practical SCADA for industry	David Bailey Edwin Wright	Newnes

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

ELECTRICAL MACHINE DESIGN

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMIL NADU

M-SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 3**3073**

Semester : V Semester

Subject Title : **ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester : 16

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment marks		
			Internal	Board Examination	Total
ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)	5	80	25	75	100

TOPICS AND ALLOCATION OF TIME

UNIT	TOPIC	TIME (Hours)
I	Electrical Machine Design – Basic Consideration	12
II	Magnetic Circuit Calculations	12
III	Design of Transformer	14
IV	Design of dc machines	14
V	Design of ac machines	16
	Tests and Revisions for above Units	12
	Total	**80**

RATIONALE

Through out the country there are many electrical industries and 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. These Industries have R&D center, Diploma or Graduate engineers as R&D engineers for product development. Hence it is necessary to include electrical machine design as one of the subject at diploma level courses.

OBJECTIVES

To understand

- Static and Rotating Electrical Machine specifications, materials, losses and effects of temperature rise.
- Magnetic force, magnetic force gap, teeth and leakage flux in static and rotating electrical machines.
- Designing of single phase, three phase transformer, core and coil.
- Designing of dc machines.
- Designing of 3phase induction motor and 3phase synchronous machines.

33073 ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)

DETAILED SYLLABUS

Contents : Theory

Unit	Name of the Topic	Hours	Marks
I	**Electrical Machine Design – Basic Consideration** Design definition – Design consideration – limitation – constructional elements of Transformers and rotating machines – constructional materials of electrical machines – conducting magnetic and insulating materials standard specification – general design process – main dimensions of rotating machines – electrical and magnetic losses – temperature – rise – class of duty – limits of temperature rise.	12	15
II	**Magnetic Circuit Calculations** Magnetic circuits of DC machines, round rotation AC machines, salient poles AC machines and Transformer - Specific magnetic and electrical loading – Factor influencing the specific and magnetic loading – Magnetic leakages – magnetering curves – calculation of magnetizing force for the air gap of rotating machines and for teeth – leakage flux – leakage reactance – armature slot leakage reactance	12	15
III	**Design of Transformer** Important considerations – core and shell types – distribution transformers and power transformers – core section – clearance – yoke section – main dimension – single phase core type transformers – three phase core type transformer – output coefficient - voltage per turn – specific magnetic and electric loading of transformer – Winding design – cross over, helix, disc helix.	14	15
IV	**Design of dc machines** Important design consideration – number of poles – advantages of large number of poles - air gap – armature slot – current density – field system – commutator – design of large dc motor. Specific magnetic and electric loading of dc machines.	14	15
V	**Design of ac machines** AC machine design consideration – power equation – separation of diameter and length – problems. Three phase induction motor – important design consideration – standard frames and stampings – gap length – flux density – current density – power factor – efficiency – slot combination – winding - design of 3 phase induction motors. Three phase	16	15

	synchronous machines – important design consideration – radial gap length – stator slot – stator coil – rotor construction – design of 3 phase synchronous machines.		

TEXT BOOK

Title	Author(s)	Publishers	Edition
Course in electrical machine design	A.K.Sawhney	Dhanrai publishing company	

REFERENCE BOOKS

Sl.No	Title	Author(s)	Publishers	Edition
1	principles of Electrical Machine Design	S.K.Sen	Oxford & IBH	
2	Principles of Electrical Machine Design	R.K.Agarwal	S.K.Kataria & Sons	
3	Design of Electrical Machine	Mittle V.N	Standard Book – House	
4	Electrical Machine Design	A.Nagoor Kani	RBA Publications	
5	Electrical Machine Design	C.Eswarlal	Sonaversity	
6	Performance and Design of AC Machine	M.G.Say	CBS Publisher & Distributor	

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33055

Semester : V Semester

Subject Title : **COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
COMPUTER AIDED ELECTRICAL DRAWING PRACTICAL	4	60	25	75	100	3 hrs

RATIONALE

This subject is introduced in order to impart skill of making computer aided electrical drawing.

OBJECTIVES

At the end of the semester 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 panels

PART-A

ELECTRICAL SYMBOLS-DRAWING (5*2=10)

1. Draw the symbols for components: Resistor, Capacitor, Inductor, Diode, Transistor, FET, SCR, UJT, TRIAC, DIAC, and Gates AND, OR, NOT, NAND, NOR, EXOR.
2. Draw the symbols used in electrical wiring: Relays, contactors, fuses, main switch, electric bell, earth, DPST, DPDT, TPST, Neutral link.
3. Draw the symbols for instruments: Ammeter, Voltmeter, Wattmeter, Energy meter, Frequency meter, Power factor meter, Timer and Buzzers.
4. Draw the symbols for machines: Armatures, Alternators, Field winding (Shunt, Series and Compound) Transformer and Autotransformer.

PART-B

(1*60=60)

ELECTRICAL CONNECTION DIAGRAMS- DRAWING

1. Draw the Single Line diagram of Single phase MCB Distribution board.
2. Draw the Single Line diagram of three phase MCB Distribution board.
3. Draw the Single Line diagram of typical MV Panel.
4. Draw the Single Line diagram of Lighting Distribution Board (LDB).
5. Draw the Single Line diagram of Motor Control Centre (MCC) Panel.
6. Draw the Single Line diagram of fire alarm riser arrangement in multi-storey building.
7. Draw the Single Line diagram of intercom arrangement in multi-storey building.
8. Draw the front end schematic diagram of typical Sub switch board (SSB).
9. Draw the winding diagram of lap connected DC armature with commutator connections and brush positions.
10. Draw the control and main circuit of automatic star delta starter.
11. Draw the mush winding diagram of a three phase induction motor.
12. Draw the concentric winding diagram of a single phase induction motor.
13. 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 1 to 13.
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**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

Microcontroller practical

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject code : 34056

Semester : V Semester

Subject title : Microcontroller practical

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hrs./ Week	Hrs./ Semester	Internal Assessment	Board Examination	Total	
Microcontroller practical	4	60	25	75	100	3 Hrs

ALLOCATION OF MARKS

Scheme of Examinations

The Evaluation has to be done as given below

Allocation of marks for Board Practical Examination

I) Programme - 30 Marks

II) Debugging and Execution - 30 Marks

III) Result - 10 Marks

IV) Viva – Voce - 5 marks

Total - 75 Marks

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

34056 - MICROCONTROLLER PRACTICAL

Note1: ALL THE EXPEIMENTS SHOULD BE CONDUCTED

2: DIFFERENT DATA ARE TO BE GIVEN FOR EACH BATCH

Part-A

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

1. Write an Assembly Language Program for interfacing Digital I/O board and test it.

2. Write an Assembly Language Program for interfacing Matrix keyboard and test it.

3. Write an Assembly Language Program for interfacing seven segment LED displays and test it.

4. Write an Assembly Language Program for interfacing Traffic light control and test it.

5. Write an Assembly Language Program for interfacing 8 bit ADC and test it.

6. Write an Assembly Language Program for interfacing 8 bit DAC and test it.

7. Write an Assembly Language Program for interfacing STEPPER MOTOR and test it.

8. Write an Assembly Language Program for interfacing DC motor and test it.

9. Write an Assembly Language Program for Sending data through serial port between controller kits and test it.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

CONTROL OF ELECTRICAL MACHINES PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33074

Semester : V Semester

Subject Title : **CONTROL OF ELECTRICAL MACHINES PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
CONTROL OF ELECTRICAL MACHINES PRACTICAL	4	60	25	75	100	3 hrs

RATIONALE

Various control operations are to be performed on the electrical machines to suits the industrial requirements. Technicians are mainly employed to look after the control panels. To make our students employable, they have to be trained in using various control components and circuits. This subject fulfils that requirement.

OBJECTIVES

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

- Make use of various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
- Construct various types of automatic starters for electrical motors.
- Construct control circuits for braking, jogging, reversing operations.
- To make use of PLCs for control applications.
- To program PLCs for controlling the motor.

LIST OF EXPERIMENTS

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 –delta starter.
5. Wire and test the control circuit for automatic star –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 –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**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

PROGRAMMABLE LOGIC CONTROLLER PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33075

Semester : V Semester

Subject Title : **PROGRAMMABLE LOGIC CONTROLLER PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per semester: 15

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
PROGRAMMABLE LOGIC CONTROLLER PRACTICAL	6	90	25	75	100	3 hrs

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.,
- To program PLCs for controlling Heater and motors.

LIST OF EXPERIMENTS:

1. Interfacing of Limit switch, Reed switch and Proximity switch with PLC.
2. DOL starter with single phase prevention.
3. EB to Generator Change over switch implementation with interlocking
4. Star Delta starter
    a. Single phasing prevention
    b. Adjustable star-delta transfer time
    c. Pre-settable overload trip time
5. Automatic load transfer
    a. Transfers load from one phase to another when one phase in a three phase system fails
    b. Automatically restores when power is resumed
    c. Time delays are effected to prevent action during short time failure
6. Fill the water in water tank and maintain the water level.
    a. When water level comes below lower level switch ON the pump
    b. When water level reaches the high level switch OFF the pump
    c. Include manual switch to operate the pump at any level of water.
7. Fire alarm
    a. Multiple alarms
    b. Sound alarm
    c. If not acknowledged, Sound alarms 1 and 2
    d. Similarly go up to 4 alarm conveyor belt sorting
8. Three floor Lift control
9. Traffic light control
10. Automatic operation of double acting pneumatic cylinder – Multi cycle
11. Sequential operation of two Double Acting Cylinders for the sequence A+,B+, B-,A-
12. Analog input to PLC as a set of valve for a comparator function block
    a. The input is multilevel illumination control. The input is 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 illumination.
13. Heater control with PID function of the PLC
    a. A 1000 W water heater is controlled using the PID function of the PLC. The temperature transducer is a temperature transmitter with 4 to 20 mA output and Pt 100 Probe.
14. Round table liquid filling system
    a. Dropping of Reagents into test tubes. The feedback is from potentiometer. The program must ensure that the end limits of the pot are never reached by carefully balancing the clockwise and anti-clockwise revolution.
15. Slow speed motor control using PWM function of the PLC
    a. Slow speed 12V DC 18W permanent magnet motor with fly wheel is controlled with the PWM output and feedback from a low resolution encoder.

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**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

Electrical Machine Design Practical

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 3**3076**

Semester : V Semester

Subject Title : **Electrical Machine Design Practical**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester : 16

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment marks		
			Internal	Board Examination	Total
Electrical Machine Design Practical	5	80	25	75	100

33076 ELECTRICAL MACHINE DESIGN PRACTICAL (Elective practical I)

List of Experiments

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.

33076 ELECTRICAL MACHINE DESIGN PRACTICAL (Elective practical II)

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

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

VI SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

DISTRIBUTION AND UTILIZATION

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33061

Semester : VI Semester

Subject Title : **DISTRIBUTION AND UTILIZATION**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
DISTRIBUTION AND UTILIZATION	6	90	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	Distribution	18
II	Industrial Drives	15
III	Electric Traction	16
IV	Illumination	17
V	Electric Heating And Welding	16
	Revision and Test	08
	Total	**90**

RATIONALE

Distribution system is that part of power system which distributes power to the consumers for utilization. So 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.

DETAILLED SYALLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**DISTRIBUTION** **Substation:** Introduction-Sub stations-classification of sub stations-Indoor and outdoor S.S – Gas insulated S.S-comparisons-Layout 110/11KV Substation and 11KV/400V Distribution Substation-substation equipments-Bus bar- Types of bus bar arrangement -Advantages and Disadvantages. **Distribution:** Distribution system-Requirements of a Distribution system-part of Distribution system- classification of Distribution systems-comparison of different distribution systems (A.C and D.C) -A.C Distribution -Types-connection schemes of Distribution system-A. C Distribution calculations-Calculation of voltage at load points on single phase distribution systems (With concentrated load only)- Distribution fed at one end, both ends and ring mains-problems- Three phase, four wire, Star connected unbalanced load circuit- Problems- consequence of Disconnection of Neutral in three phase four wire system (illustration with an example)	18
II	**INDUSTRIAL DRIVES** Introduction-Electric drive- Advantages-parts of Electric drives-Transmission of power-Types of Electric drives-Individual, group and multi motor drives – Advantages and disadvantages of Individual and group drive -Factors governing the selection of motors-Nature and classification of load Torque-Matching of speed Torque characteristics of load and motor-Standard ratings of motor- classes of load duty cycles-Selection of motors for different duty cycles-Selection of motors for specific application-Braking- Features of good braking system- Types of Braking- Advantages of- Electric braking-Plugging, Dynamic and Regenerative braking-As applied to various motors.	15
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, centenary and droppers-	16

	current collection gear for OHE-Bow and pantograph collector-Different systems of Track Electrification-Advantages of single phase low frequency A. C. system-Booster Transformer-Necessity- Methods of connecting B.T-Neutral sectioning. **Traction Mechanics:** Units and notations used in Traction mechanics-Speed time curve for different services - simplified speed time curve-Derivation of maximum speed-crest speed, Average speed, Schedule speed (definitions only)-Tractive effort and power requirement- Specific energy output- specific energy consumption. **Traction motors and control:** Desirable characteristics of Traction motors-Motors used for Traction purpose-Methods of starting and speed control of D.C Traction motors-Rheostatic Control-energy saving with plain rheostatic control series- parallel control- Energy saving with series parallel starting - Shunt Transition -Bridge-Transition- multiple unit control –Regenerative braking. Recent trends in Electric Traction-Magnetic Levitation (MEGLEV) - Suspension systems.	
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 –Induction Lamp- Energy saving lamps (C.F.L and L.E.D lamps)-limitation and disposal of C.F.L-benefits of led lamps-comparison of lumen output for led CFL and incandescent lamp.	17

V	**ELECTRIC HEATING AND WELDING** **Electric Heating:** Introduction -Advantages of Electric heating-modes of heat transfer- classification of Electric Heating - Power frequency electric heating- Direct and Indirect resistance heating-Infrared heating-Arc heating –High frequency Electric heating- Induction heating-Induction Stove –Eddy current heating and Dielectric heating. **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).	16

TEXT BOOK

S.No	Name of the Book	Author	Publisher
1	A Course in Electrical Power	Soni & Gupta	Dhanpat Rai & Sons, Delhi

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1.	Electric Power	SL Uppal	Khanna Publishers, New Delhi
2.	Modern Electric Traction	H Partab	Dhanpat Rai & Sons, New Delhi
3.	Electrical Power Distribution System	AS Pabla	Tata McGraw Hill Publishing Co, New Delhi
4.	Utilization of Electric Power	NV Suryanarayana	Tata McGraw Hill Publishing Co, New Delhi

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33062

Semester : VI Semester

Subject Title : **OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
OPERATION AND MAINTENANCE OF ELECTRICAL EQUIPMENT	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

Unit	Topic	Time (Hrs)
I	Earthing Arrangements, Safe Working Of Electrical Equipment, Building Electrical Installations	13
II	Operation & Maintenance Of Transformer	13
III	Operation & Maintenance Of Generators, Sub-Stations And Circuit Breakers	13
IV	Operation & Maintenance Ac Motors And Starters	12
V	Operation & Maintenance Of Lighting, Transmission And Distribution	12
	Revision And Tests	12
	Total	**75**

Rationale

- Electricity is generated in power station transmitted through transformer lines and Distributed through Distribution systems.
- The various activities concerning operation and maintenance of electrical equipments are dealt in this subject.

Objective

- Understand building 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

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
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, and 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	**13**
II	**OPERATION & MAINTENANCE OF TRANSFORMER** Forces generated in transformer during short circuit - Noise in operation – Reason for temperature rise- -insulation resistance-Drying out- precaution for paralleling transformer-inrush current and remedy- insulation co-ordination-effect on insulation during star point earthing –transformer maintenance schedule – action to be taken while transformer oil, temperature rises unduly – points to be checked by oil level tends to fall down – attention required for bushing and insulator.	**13**
III	**OPERATION & MAINTENANCE OF GENERATORS, SUB-STATIONS AND CIRCUIT BREAKER** **Generators-** Parallel operation of Alternators, Real power and Reactive power adjustment between alternator running in parallel, AVR role, Causes for Alternator fails to buildup, Instability in Alternator, Cyclic speed irregularity, Protective & Indicative equipments for Alternator, Causes for overheating of armature &	**13**

	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	
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.	**12**
V	**OPERATION & MAINTENANCE OF LIGHTING, TRANSMISSION AND DISTRIBUTION** **LIGHTING** Glare reduction, Stroboscopic Effect and methods to reduce, Steps in Designing Lighting Installation, Troubleshooting 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	**12**

	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

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

POWER ELECTRONICS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33081

Semester : VI Semester

Subject Title : **POWER ELECTRONICS**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
POWER ELECTRONICS	5	75	25	75	100	3 hrs

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	Overview Of Power Electronics	13
II	Line Commutated Power Control Circuits	13
III	Forced Commutated Power Control Circuits	13
IV	Applications Of Power Electronics	12
V	Motor Drive Applications	12
	Revision and Test	12
	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 eclectic power in terms Kilo-Amps and Kilo-Volts. This subject gives a comprehensive knowledge base about the devices and circuits used in electrical power control.

OBJECTIVES:

On completion of these units, the student should be able to:

- Explain the scope and application of power electronics
- Explain the operating region and rating of SCR.
- Draw, explain and state the application for commutation circuits and trigger circuits of SCR.
- Familiarize the phase controlled rectifier and know the applications of the phase controlled rectifier.
- Draw and describe the working of half wave controlled rectifier circuit with R and RL load, single phase Semi Converter Bridge, Single phase full Converter Bridge for RL load, single phase and three phase full converter with RL load.
- Familiarizes the dual converter and twelve pulse converters.
- Study the complete protection of converter circuits.
- Understand the working choppers and inverters.
- Know the applications of choppers and inverters.
- Explain the various types of choppers with circuit diagram.
- Describe the various methods of inverters with circuit diagram.
- Failure of AC voltage controller & cyclo converter.
- Understand the application of power electronics devices as CB,UPS and VAR compensator
- Understand the control of DC Drives.
- Know the various methods of speed control of DC drives.
- Familiarize the control of AC drives.
- Know the torque - speed characteristics of three phase induction motor.
- Study the speed control of three phase induction motor using PWM and slip power recovery scheme.
- Understand the closed loop control of AC drive.
- Know the operation of single phase and three phase cyclo converter.
- Understand the micro controller based fault diagnosis in three phase thyristor converter circuits.
- Study the need of DSP based motor control.

DETAILED SYLLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	**OVERVIEW OF POWER ELECTRONICS** Power electronics-Definition (A-1.1)-Scope and Applications (B-1.3)-Power Electronic Switch Specifications (A-1.4.3)-Types of Power Electronic Circuits (A-1.5)-Design of Power Electronics Equipment (A-1.6)-Power module (A-1.9)-Intelligent module (A-1.10). Silicon Controlled Rectifier(D-2.4.1)-Forward Blocking Region(D-2.4.2)-Forward Conducting Region(D-2.4.3)-Reverse Blocking Region(D-2.4.4)-Effect of dv/dt and Snubber Circuits (D-2.4.7)-Effect of Rate of Rise in Current(di/dt)(D-2.4.8)-Thyristor Ratings(D-2.4.11) -Thyristor Gate Requirements(D-3.2)-Triggering Circuits for Thyristor(D-3.3)-Resistance Triggering Circuits(D-3.4.1)-RC Trigger Circuits(D-3.4.1)-UJT based Trigger Circuits-Driver and Buffer Circuits for Thyristor(D-3.4.7) Thyristor Commutation Techniques-Class A, Class B, Class C, Class D, Class E Types(C-5.1 to C-5.6)-Power Devices – MOSFET (A.8.3)-IGBT (A.8.5) – GTO (A.4.8.3)	13
II	**LINE COMMUTATED POWER CONTROL CIRCUITS** Line Commutated Converters(Controlled Rectifiers)-Principle of Phase Controlled Converter Operation(A-10.2)-Single Phase Full Converters(A-10.3)-Single Phase Dual Converters (A-10.3)-Three Phase Full Converters(A-10.6)-Three Phase Dual Converters(A-10.7)-12 Pulse converters(A-10.12) AC Voltage Controllers-Principle of Phase Control(A-11.3)-Single phase Bidirectional controllers with Resistive Load(A-11.4)-Single Phase Controller with Inductive Load(A-11.5)-Three Phase Full Wave Controllers(A-11.6)- Cyclo Converters-Single Phase Cyclo Converters(A-11.9.1)-Three Phase Cyclo Converters(A-11.9.2)	13

III	**FORCED COMMUTATED POWER CONTROL CIRCUITS** DC-DC Switch-Mode Converters(Choppers)-Control of DC-DC Converters(B-7.2)-Step-Down(BUCK) Converter(B-7.3)-Continuous-Conduction Mode(B-7.3.1) - Step-Up(BOOST) Converters(B-7.4)-Continuous Conduction Mode (B-7.4.1) –BUCK-BOOST Converters (B-7.5) – Continuous Conduction Mode (B-7.5.1) - Cuk DC-DC Converters(B-7.6) DC-AC Switch-Mode Inverters-Pulse Width Modulated Inverters-Introduction(A-6.1)-Principle of Operation(A-6.2)-Single Phase Bridge Inverters(A-6.4)-Three Phase Inverters(A-6.5)-180^0 Conduction Mode(A-6.5.1)-120^0 Conduction Mode(A-6.5.2)-Voltage Control of Single Phase Inverters(A-6.6)-Single Pulse Width Modulation(A-6.6.1)-Multiple Pulse Width Modulation(A-6.6.2)-Sinusoidal Pulse Width Modulation(A-6.6.3)-Voltage Control of Three Phase Inverters(A-6.8)-Sinusoidal PWM(A.6.8.1).	13
IV	**APPLICATIONS OF POWER ELECTRONICS** Switch Mode Power Supplies-Full Bridge Converter type(C-11.1.4)-Uninterrupted Power Supply-ON line(No Break) and OFF line(Short-Break) types(C-11.2)-Static AC Circuit Breaker(C-11.5.1)-AC Solid State Relays(C-11.6.2). High Frequency FlourescentLighting (B -16.2.2)-Induction Heating(B16.3.1)-Electric Welding(B -16.3.2)-High Voltage DC Transmission(B -17.2)-Wind and Small Hydro Interconnection(B -17.4.2)-Static VAR Compensators(B -17.3)-Thyristor Controlled Inductors (B -17.3.1)-Thyristor Switched Capacitors(B -17.3.2).	12

V	**MOTOR DRIVE APPLICATIONS** DC Drives-DC Motor with a Separately Excited Field Winding(B -13.4)-Line Frequency Converters (B-13.7.2)-Effect of Discontinuous Armature Current(B -13.7.3)–Control of Adjustable Speed Drives(B -13.7.4)-Switch-Mode DC-DC Converters(B -13.7.1) Induction Motor Drives-Introduction(B -14.1)-Basic Principle of Induction Motor Operation (B -14.2)-Induction Motor Characteristics at rated(line) frequency and rated voltage(B -14.3)-Speed Control by Varying Stator frequency and voltage(B -14.4)-Torque-Speed Characteristics(B -14.4.1)-Start-Up Considerations(B -14.4.2)-Voltage Boost required at low frequencies(B -14.4.3)-Induction Motor Capability below and above the rated speed(B -14.4.4)-Variable frequency Converter Classifications(B -14.6)-Variable frequency PWM-VSI Drives (B -14.7)-Line frequency Variable-Voltage Drives(B -14.11)-Reduced Voltage Starting("Soft Start") of Induction Motors(B -14.12)-Speed Control by Static Slip-Power Recovery(B -14.13).	12

TEXT BOOKS:

S. No.	Book Name	Author	Publication	Edition
1	Power Electronics	MD Singh, KB Dhanchandaniata	McGraw Hill Publishing Company New Delhi	seventeenth reprint 2005

REFERENCE BOOKS:

S. No.	Book Name	Author	Publication	Edition
1.	"Power Electronics" - A	Mohammed H.Rashid	New Age Publication.	Third Edition,2004
2.	"Power Electronics" - B	Mohan, Undeland, Robbins.	Wiley India Edition.	Media Enhanced Third Edition
3.	"Power Electronics" - C	Dr.P.S.Bimbhra	Khanna Publishers.	Fourth Edition, 2011.
4.	"Power Electronics" - D	M.S.Jamil Asghar	PHI Learning Private Limited	Eastern Economy Edition, 2010

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

BIO MEDICAL INSTRUMENTATION

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject code : 34082

Semester : VI Semester

Subject title : ELECTIVE THEORY - II :BIO MEDICAL INSTRUMENTATION

TEACHING AND SCHEME OF EXAMINATION:

Number of Weeks/ Semester : 15 weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hrs./ Week	Hrs./ Semester	Internal Assessment	Board Examination	Total	
Bio Medical Instrumentation	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION

Unit	Topic	Time (Hrs)
I	Bio - electric signals, electrodes and clinical measurement	13
II	Bio - medical recorders	13
III	Therapeutic instruments	13
IV	Biotelemetry and patient safety	14
V	Modern imaging techniques	12
Vi	Revision, Test	10
	TOTAL	75

RATIONALE

Bio medical engineering education is in the growing stage. But every year, there is a tremendous increase in the use of modern medical equipment in the hospital and health care industry therefore it is necessary for every student to understand the functioning of various medical equipments. This subject to enable the students to learn the basic principles of different biomedical instruments vizClinical measurement, Bio - medical recorders, Therapeutic instruments, Biotelemetry and Modern imaging techniques instruments.

OBJECTIVES

After learning this subject the student will be able to understand the about

- The generation of Bio-potential and its measurement using various electrodes.
- The measurement of blood pressure.
- The measurement of lung volume.
- The measurement of respiration rate.
- The measurement of body temperature and skin temperature.
- The principles of operations of ECG recorder.
- The principles of operations of EEG recorder.
- The principles of operations of ENG recorder.
- The working principles of audio meter.
- The principles of operations of pacemaker.
- The basic principle of dialysis.
- The basic principle of short wave diathermy.
- The basic principle of ventilators.
- The working principles of telemetry.
- The basic principle of telemedicine.
- To learn about patient safety.
- The various methods of accident prevention.
- The basic principle of various types of lasers.
- The basic principle of CT and MRI scanner.
- The principle of operation of various imaging techniques

34082 - BIO MEDICAL INSTRUMENTATION

DETAILED SYLLABUS

Units	Name of the topic	Hours
I	**BIO-ELECTRIC SIGNALS AND ELECTRODES** Elementary ideas of cell structure, Bio – potential and their generation – resting and action potential – propagation of action potential. Electrodes – Micro – Skin surface – needle electrodes. **CLINICAL MEASUREMENT:** Measurement of Blood pressure (direct, indirect) – blood flow meter (Electro magnetic& ultrasonic blood flow meter) – blood pH measurement - Measurement of Respiration rate – measurement of lung volume – heart rate measurement – Measurement of body and skin temperature - Chromatography, Photometry, Flurometry.	13
II	**BIO - MEDICAL RECORDERS:** Electro cardiograph (ECG) – Lead system – ECG electrodes – ECG amplifiers – ECG recording units – analysis of ECG curves. Nervous system – EEG recorder – 10-20 lead system – recording techniques – EEG wave types – Clinical use of EEG – brain tumour Electro – myograph (EMG) – EMG waves – measurement of conduction velocity – EMG recording techniques – Electro – retinograph (ERG) Audiometer – principle – types – Basics audiometer working.	13
III	**THERAPEUTIC INSTRUMENTS:** Cardiac pacemaker – classification – External pace makers – implantable pacemaker – pacing techniques – programmable pacemaker – Cardiac defibrillators – types – AC and DC defibrillators - Heart lung machine with Block diagram. Dialysis – Hemo dialysis – peritoneal dialysis. Endoscopes Endoscopic laser coagulator and applications – physiotherapy equipment – short wave diathermy – micro wave diathermy – ultrasonic therapy unit (block / circuit) – Ventilators – types – modern ventilator block diagram.	13

IV	**BIOTELEMETRY AND PATIENT SAFETY:** Introduction to biotelemetry – physiological – adaptable to biotelemetry – components of a biotelemetry system – application of telemetry – elements of biotelemetry; AM, FM transmitter and receiver – requirements for biotelemetry system – radio telemetry with sub carrier – single channel and multi channel telemetry – Telemedicine; introduction, working, applications. Patient safety: Physiological effects of electric current – Micro and macro shock – leakage current – shock hazards from electrical equipment. Methods of Accident Prevention – Grounding – Double Insulation – Protection by low voltage – Ground fault circuit interrupter – Isolation of patient connected parts – Isolated power distribution system. Safety aspects in electro surgical units – burns, high frequency current hazards, Explosion hazards.	14
V	**MODERN IMAGING TECHNIQUES:** LASER beam properties – block diagram – operation of CO2 and NDYag LASER – applications of LASER in medicine. X ray apparatus – block diagram – operation – special techniques in X-ray imaging – Tomogram – computerized Axial tomography – Ultrasonic imaging techniques – Echo cardiography – Angiography – CT scanner - Magnetic resonance imaging techniques.	12
	Revision and Test	10

Text Book:

Dr.M. Arumugam – Biomedical Instrumentation ,Anuradha publications, chennai (Page no. 1-15, 21-33, 117-136,142-159,164-179, 182-195, 202-209, 212-215, 255 – 256, 274-277, 285-286, 266-268, 293-297, 299- 310, 319-320, 329 – 340, 347-358, 360-367, 374-390, 390-400)

Reference Books.

- Leslie Cromwell –Fred j. Wibell, Erich A.P Feither – Bio medical Instrumentation and measurements, II Edition.
- (Page no. 49-64, 63-76, 93-97, 106-149,195-205, 260-276, 296-303, 316 – 339, 363- 383,430-439)
- Jacobson and Webstar – Medicine and clinical Engineering.
- R.S .Khandpur – Hand book of Bio –Medical Instrumentation.
- Medical Electronics - Kumara doss
- Introduction to Medical Electronics. B.R. Klin
- Introduction to Biomedical Instrumentation Mandeep Singh Printice Hall India 2010.

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

COMPUTER HARDWARE AND NETWORKS

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 34682

Semester : VI

Subject title : COMPUTER HARDWARE AND NETWORKS

TEACHING & SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instructions		Examination			Duration
	Hours / Week	Hours / Semester	Internal Assessment	Board Examination	Total	
COMPUTER HARDWARE AND NETWORKS	5	75	25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

Sl.No	Topic	Time (Hrs)
1	MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES	13
2	I/O DEVICES AND INTERFACE	13
3	MAINTENANCE AND TROUBLE SHOOTING OF DESKTOP AND MOBILE PHONES	14
4	COMPUTER NETWORK DEVICES AND OSI LAYERS	12
5	802.X AND TCP/IP PROTOCOLS	13
	Revision and Examinations	10
	TOTAL	75

RATIONALE

Maintaining and servicing the computers, laptops and peripherals are essential requirements of the computer students. The clear understanding of computer network devices and protocols are also taught in this subject.

OBJECTIVES

On completion of the following units of syllabus contents, the students can

Identify the major components that make up the system unit.

Understand the principle of operations of Keyboard, mouse and Displays.

Study about the specification of I/O Ports of all I/O devices like serial, parallel, USB – Game port, Blue tooth and IP Connectors

Understand the technology of high quality multiple color graphic output devices like Dot matrix, Inkjet, Laser, Line, MFP and computer system.

Understand the operations to Power Supply devices. Know the use of diagnostic Software.

Identify the major components of Laptop. Troubles shoot the problems in Laptop.

Understand the concept of data communication.

Discuss the advantages and disadvantages of different network topologies. Compare different network classifications based on different category.

Know the use of different network devices.

Understand the different layers of OSI and their functions. Compare different LAN protocols.

Identify the protocols used in TCP /IP and compare with OSI model. Understand IP address concepts and TCP/IP suite.

DETAILED SYLLABUS

UNIT I MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES		**13 HOURS**
1.1	**Introduction:** Parts - Mother board, sockets, expansion slots, memory, power supply, drives and front panel and rear panel connectors – Hardware, Software and Firmware.	**3 Hrs**
1.2	**Processors:** Architecture and block diagram of multi core Processor(any one), Features of new processor(Definition only)-chipsets (Concepts only)	**2 Hrs**
1.3	**Bus Standards** Overview and features of PCI, AGP, USB, PCMCIA, Processor BUS – High	**2 Hrs**
1.4	**Primary Memory**: Introduction-Main Memory, Cache memory –DDR2- DDR3, RAM versions – 1TB RAM – Direct RDRAM	**1 Hrs**
1.5	**Secondary Storage:** Hard Disk – Construction – Working Principle – Specification of IDE, Ultra ATA, Serial ATA; HDD Partition - Formatting. Troubleshooting hard disk drives.	**3 Hrs**
1.6	**Removable Storage:** CD&DVD construction – reading & writing operations; CD-R,CD-RW; DVD-ROM, DVD-RW; construction and working of DVD Reader / Writer. Blue-ray: Introduction – Disc Parameters – Recording and Playback Principles – Solid state memory devices.	**2 Hrs**
UNIT II I/O DEVICES AND INTERFACE		**13 HOURS**
2.1	**Keyboard and Mouse:** Keyboard: Signals – operation of membrane and mechanical keyboards–troubleshooting; wireless Keyboard**.** Mouse- types, connectors, operation of Optical mouse and Troubleshooting.	**3 Hrs**
2.2	**Printers:** Introduction – Types of printers– Dot Matrix, Laser, line printer, MFP (Multi Function Printer), Thermal printer - Operation –Construction – Features and Troubleshooting	**4 Hrs**
2.3	**I/O Ports:** Serial, Parallel, USB, Game Port, Bluetooth interface, IR connector, fire ware, Signal specification problems with interfaces.	**2 Hrs**

2.4	**Displays and Graphic Cards:** Panel Displays– Principles of LED, LCD and TFT Displays. SVGA Port signals – common problems and solutions.	**2 Hrs**
2.5	**Power Supply:** SMPS: Principles of Operation and Block Diagram of ATX Power Supply, connector specifications	**2 Hrs**
UNIT III BIOS, POST and Mobile Phone Servicing		**14 HOURS**
3.1	**BIOS:** Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication – upgrading BIOS, Flash BIOS - setup.	**2 Hrs**
3.2	**POST:** Definition – IPL hardware – POST Test sequence – beep codes and error messages.	**2 Hrs**
3.3	M**obile phone components:** Basics of mobile communication. Components - battery**-** antenna-ear piece- microphone -speaker-buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobile phones.	**3 Hrs**
3.4	**Tools & Instruments used in mobile servicing**: Mobile servicing kit -- soldering and de-soldering components using different soldering tools - Use of multi-meter and battery booster.	**2 Hrs**
3.5	**Installation & Troubleshooting:** Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting- Jumpering techniques and solutions.	**2 Hrs**
3.6	**Software and Antivirus**: Flashing- Formatting- Unlocking -Use of secret codes- Downloading- Routing;Mobile Viruses – Precautions – Antivirus Software.	**3 Hrs**
UNIT – IV COMPUTER NETWORK DEVICES AND OSI LAYERS		**12 HOURS**
4.1	**Data Communication:** Components of a data communication – Data flow: simplex – half duplex – full duplex; Networks – Definition - Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.	**3 Hrs**
4.2	**Types of Networks:** LAN – MAN – WAN – CAN – HAN – Internet – Intranet –Extranet ,Client-Server, Peer To Peer Networks.	**2 Hrs**
4.3	**Transmission Media:** Classification of transmission media - Guided – Twisted pair, Coaxial, Fiber optics; Unguided – Radio waves – Infrared – LOS – VSAT – cabling and standards.	**3 Hrs**
4.4	**Network devices:** Features and concepts of Switches – Routers(Wired and Wireless) – Gateways.	**2 Hrs**
4.5	**Network Models:** Protocol definition - standards - OSI Model – layered architecture – functions of all layers.	**2 Hrs**
UNIT V 802.X AND TCP/IP PROTOCOLS		**13 HOURS**
5.1	**Overview of TCP / IP :** OSI & TCP/IP – Transport Layers Protocol – connection oriented and connectionless Services – Sockets – TCP & UDP.	**3 Hrs**
5.2	**802.X Protocols :** Concepts and PDU format of CSMA/CD (802.3) – Token bus (802.4) – Token ring (802.5) – Ethernet – type of Ethernet (Fast Ethernet, gigabit Ethernet) – Comparison between 802.3, 802.4 and 802.5	**3 Hrs**
5.3	**Network Layers Protocol:** IP –Interior Gateway Protocols (IGMP, ICMP, ARP, RARP Concept only).	**3 Hrs**

5.4	**IP Addressing :** Dotted Decimal Notation –Subnetting & Supernetting – VLSM Technique-IPv6 (concepts only)	**2 Hrs**
5.5	**Application Layer Protocols:** FTP– Telnet – SMTP– HTTP – DNS – POP	**2 Hrs**

TEXT BOOKS

S.No	Title	Author	Publisher	Year of Publishing / Edition
1.	Computer Installation and Servicing	D.Balasubramanian	Arasan Ganesan Institute of Technology	1993
2.	The complete PC upgrade and Maintenance	Mark Minasi	BPB Publication	1997
3.	Troubleshooting, Maintaining and Repairing PCs	Stephen J Bigelow	Tata MCGraw Hill Publication	2004
4.	Computer Networks	Andrew S.Tanenbaum	Prentice-Hall of India, New Delhi	2002
5.	Data Communication and networking	Behrouz A.Forouzan	Tata Mc-Graw Hill, New Delhi	2006
6.	Data and Computer Communications	William Stallings	Prentice-Hall of India	Eighth Edition 2007

REFERENCE BOOKS

S.No	Title	Author	Publisher	Year of Publishing / Edition
1.	Computer Networks	Achyut Godbole	Tata Mc-Graw Hill - New Delhi	
2.	Principles of Wireless Networks– A unified Approach	Kaveh Pahlavan and Prashant krishnamoorthy	Pearson Education	2002

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

WIRING & WINDING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering
Subject Code : 33064
Semester : VI Semester
Subject Title : **WIRING & WINDING PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
WIRING & WINDING PRACTICAL	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
	5	75	25	75	100	3 hrs

RATIONALE

To provide hands on experience in Electrical wiring and winding it becomes necessary to include this subject.

OBJECTIVES

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

- Execute the wiring to control three lamps Individually
- Execute the stair case wiring for G+n floors
- Execute the emergency alarm circuit
- Execute the wiring to connect a single phase motor with main switch , D.O.L starter and M.C.B
- Execute the wiring to connect a 3 phase Induction motor with main switch, star/delta starter and E.L.C.B.
- Execute the wiring for 1 phase service connection with necessary items.
- Execute the wiring to control lamps (Sodium vapour lamp, mercury vapour lamp, Fluorescent
- Tube and Neon sign lamp with a provision of fuse/ M.C.B/Electronic chock /switches
- Execute the wiring for test board with necessary items.
- Know the consequences of disconnection of Neutral in 3 phase 4 wire system.
- Execute the Tunnel wiring
- Prepare winding for potential Transformer and No volt coil with the knowledge of Design.
- Give end connections for 3 phase Induction motor winding.

LIST OF EXPERIMENTS

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.

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.	Enameled copper wire	25 SWG 36 SWG 37 SWG	Req.Qty

		38 SWG	
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**

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

ELECTRICAL CIRCUITS SIMULATION PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33065

Semester : VI Semester

Subject Title : **ELECTRICAL CIRCUITS SIMULATION PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
ELECTRICAL CIRCUITS SIMULATION PRACTICAL	5	75	25	75	100	3 hrs

RATIONALE

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

OBJECTIVES

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

- Know the various aspects of simulation software
- Simulate and test the simple electrical and electronics circuits
- Simulate and test the wave generating circuits
- Simulate and prove the simple theorems
- Simulate and test the performance characteristics of converters
- To design and verify the results of various electric circuits using simulation software.

LIST OF EXPERIMENTS

1. a)Generate sinusoidal waveform for a RMS voltage ____ V and frequency of ___ Hz
   b) Generate a complex signal comprising of fundamental, 5^{th} harmonics and 7^{th} 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 Thevenin's theorem.
6. Simulation of half wave rectifier.
7. Simulation of full wave rectifier.
8. Simulation of single phase, half wave converter using SCR with R-load.
9. Simulation of single phase, semi converter with RL load.
10. Simulation of single phase full converter with RL load.
11. Simulation of DC steps down chopper.
12. Simulation of single phase inverter.
13. Simulation of three phase voltage source inverter supplying R-load
14. a) Simulation of three phase star connected balanced load
    b) Simulation of three phase star connected unbalanced load
15. a) Simulation of three phase delta connected balanced load
    b) Simulation of three phase delta connected unbalanced load
16. 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.

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**

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VI SEMESTER

2015 – 2016 onwards

POWER ELECTRONICS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33084

Semester : VI Semester

Subject Title : **POWER ELECTRONICS PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours/ Week	Hours/ Semester	Internal Assessment	Board Examination	Total	
POWER ELECTRONICS PRACTICAL	5	75	25	75	100	3 hrs

RATIONALE

- The advent of thyristors has revolutionized the art of electric power conversation and its control.
- The use of the power electronic devices has pervaded the industrial applications relating to the field of Electrical, Electronics, Instrumentation and Control Engineering.
- This subject is introduced to impart practical skills to the students in using some important power electronic devices and circuits.

OBJECTIVES

- Construct and test DC-DC, DC-AC, AC-DC, AC-AC converters using power switching devices and control circuits for the same.

LIST OF EXPERIMENTS:

1. Construct the Line synchronized Ramp trigger circuit using UJT with AC load to measure firing angles.
2. Construct Lamp control circuit using DIAC – TRIAC to measure various output voltage for firing angles.
3. Construct and test the SCR commutation circuits (Class B & Class D)
4. Construct and test the Single phase semi controlled bridge with R- Load
5. Construct and test the Single phase fully controlled bridge with RL- Load
6. Construct and test the Half wave controlled rectifier with R- Load.
7. Construct and test the DC chopper control circuit using thyristor (any class).
8. Construct and test the step up chopper.
9. Design the PWM based step down DC chopper using MOSFET/IGBT.
10. Construct and test the Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT.
11. Construct and test the SMPS using MOSFET/IGBT.
12. Construct and test the open loop speed control circuit for DC shunt motor
13. Construct and test the control circuit using TRIAC for Universal motor.
14. Construct and test the Open loop speed control of Single phase AC motor.
15. Construct and test the Single phase parallel inverter using MOSFET/IGBT
16. Construct and test the Single phase to single phase cyclo converter.

LIST OF EQUIPMENTS

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.	Half wave controlled rectifier with R- Load trainer kit.	1
7.	Construct and test the DC chopper control circuit using thyristor (any class) trainer kit.	1
8.	Step up chopper trainer kit.	1
9.	PWM based step down DC chopper using MOSFET/IGBT trainer kit.	1
10.	Single phase Single pulse / Sinusoidal PWM inverter using MOSFET/IGBT trainer kit.	1
11.	SMPS using MOSFET/IGBT trainer kit.	1
12.	Open loop speed control circuit for DC shunt motor trainer kit	1
13.	Control circuit using TRIAC for Universal motor trainer kit.	1
14.	Open 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

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

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DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

BIO-MEDICAL INSTRUMENTATION PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : **33085**

Semester : VI Semester

Subject Title : **BIO-MEDICAL INSTRUMENTATION PRACTICAL**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
BIO-MEDICAL INSTRUMENTATION PRACTICAL	5	75	25	75	100	3 hrs

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. The practical work done in this area will impart skill in the use, servicing and maintenance of these instruments/equipment. Proficiency in this area will widen the knowledge and skill of diploma holders in the field of biomedical instrumentation.

List of Experiments:

1. Construction and Testing of Differential amplifier.
2. Construction and Testing of Instrumentation amplifier.
3. Measurement of pH of given solution.
4. Measurement of Blood pressure.
5. Measurement of ECG waveform.
6. Construction and verification of pacemaker circuit.
7. Construction and testing of high gain amplifier.
8. Measurement of Body and Skin temperature.
9. Study, handle and use the following Instruments/Equipments:
    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.

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III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

COMPUTER HARDWARE AND NETWORKING PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 34684

Semester : VI

Subject title : **COMPUTER HARDWARE AND NETWORKING PRACTICAL**

SCHEME OF INSTRUCTION AND EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instructions		Examination			Duration
	Hours / week	Hours / semester	Internal Assessment	Board Examination	Total	
COMPUTER HARDWARE AND NETWORK PRACTICAL	5	15	25	75	100	3 Hrs

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.

LAB EXERCISES

PART A - COMPUTER SERVICING AND NETWORK PRACTICAL	
	Identification of system layout (Study Exercise) a) Front panel indicators & switches and front side & rear side connectors. b) Familiarize the computer system Layout: Marking positions of SMPS, Motherboard, HDD, DVD and add on cards. c) Configure bios setup program and troubleshoot the typical problems using BIOS utility.
1	HARD DISK a) Install Hard Disk. b) Configure CMOS-Setup. c) Partition and Format Hard Disk. d) Identify Master /Slave / IDE Devices. e) Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software.
2	a) Install and Configure a DVD Writer & Blu-ray Disc Writer. b) Recording a Blank DVD & Blu-ray Disc.
3	Assemble a system with add on cards and check the working condition of the system and install Dual OS.
	Identification of mobile phone components (Study Exercise) a) Basic mobile phone components. b) Familiarizing the basic circuit board components: Marking position of different IC and Switches in the Network and Power sections of the PCB.
5	Flashing, Unlocking and Formatting memory cards in Mobile phones.
6	Do the following cabling works in a network a) Cable Crimpling b) Standard Cabling c) Cross Cabling d) I/O Connector Crimping e) Testing the Crimped cable using a Cable tester

7	a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration). b) Configure Internet connection and use IPCONFIG, PING / Tracert and Netstat utilities to Debug the Network issues.
9	Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network.

PART B – SYSTEM ADMINISTRATION PRACTICAL	
10	Installation of Windows 2008 / 2013 Server.
11	Installation and configuration of DHCP Server.
12	Installation and configuration of Mail Server.
13	a) Installation of Red Hat Linux using Graphical mode. b) Installation of Red Hat Linux using VMware.
14	a) Creating a user in Linux Server and assigning rights. b) Configuring and troubleshooting of /etc/inittab
15	a) Configuring and troubleshooting of /etc/grub.conf b) Configuring and trouble shooting of /etc/passwd

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.

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)	20 Marks
Result (PART – A)	5 Marks
Result (PART – B)	5 Marks
Demonstration of mini project	5 Marks
VIVA – VOCE	5 Marks
TOTAL	75 Marks

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	

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III YEAR

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PROJECT WORK

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33067

Semester : VI Semester

Subject Title : **PROJECT WORK**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROJECT WORK	4	60	25	75	100	3 hrs

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment
- Get exposure on industrial environment and its work ethics.
- Understand what entrepreneurship is and how to become an entrepreneur.
- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional Knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.
- Understand the facts and importance of environmental management.
- Understand and gain knowledge about disaster management.

INTERNAL ASSESSMENT:

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

DETAIL OF ASSESSMENT	PERIOD OF ASSESSMENT	MAX. MARKS
First review	6th week	10
Second review	14th week	10
Attendance	Entire semester 5	5
Total		25

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	65
Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e. 2 questions x 2 topics = 4 questions 4 questions x 2 ½ marks = 10 Marks	10
Total	**75**

DETAILED SYLLABUS

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection,

transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – 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 deal 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 'Environmental Waste Audit'.
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 "Sedimentation" and "Floatation" 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 – Path – 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) Nagapattinam (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 – 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?

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