MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : DIPLOMA IN ELECTRICAL ENGINEERING

COURSE CODE : EC

DURATION OF COURSE : EIGHT SEMESTERS **WITH EFFECT FROM 2013-14**

SEMESTER : FOURTH **DURATION : 16 WEEKS**

PATTERN : CORRESPONDANCE - SEMESTER **SCHEME : G**

SR. NO	SUBJECT TITLE	abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								SW (17904)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min	
1	Environmental Studies	EST	17944	06	--	20	01	50#*	20	--	--	--	--	25@	10	50
2	Electrical Circuits & Network	ECN	17948	10	01	24	03	100	40	50#	20	--	--	--	--	
3	Industry Electrical Systems-I	IES	17949	07	01	24	03	100	40	--	--	25#	10	25@	10	
4	Elements of Mechanical Engineering	EME	17950	06	01	20	02	50	20	--	--	--	--	25@	10	
			Total	**29**	**03**	**88**	--	**300**	--	**50**	--	**25**	--	**75**	--	**50**

TOTAL CONTACT HOURS DURING RESIDENT SESSION: 120 HRS [15 days * 8 hrs per day]

Total Marks : **500**

@ - Internal Assessment, # External Assessment, [redacted] No Theory Examination, #* Online Examination.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

NOTE:

1. HOURS MARKED BY * FOR INTERNAL PRACTICAL EXAMINATION TO BE CONDUCTED AT RESSIDENT SESSION.
2. **ONE TEST OF 25 MARKS** TO BE CONDUCTED AT RESIDENT SESSION AND MARKS TO BE SUBMITTED TO GPDL PUNE.
3. 240 HOURS FOR SELF STUDY AT HOME.
4. ALL PRACTICALS/ORAL EXAMS [EXTERNAL ASSESSMENT INDICATED BY #] TO BE CONDUCTED AT EXAM CENTRE.
5. ORAL EXAMINATION [INTERNAL ASSESSMENT @] TO BE CONDUCTED AT EXAM CENTRE.
6. INTERNAL ASSESSMENT @ OF TERM WORK WILL BE DONE AT RESIDENT SESSION.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : DIPLOMA IN ELECTRICAL ENGINEERING GROUP

COURSE CODE : EG

DURATION OF COURSE : EIGHT SEMESTERS **WITH EFFECT FROM 2013-14**

SEMESTER : FOURTH **DURATION : 16 WEEKS**

PATTERN : PART TIME - SEMESTER **SCHEME : G**

SR. NO	SUBJECT TITLE	abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)	
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min
1	Environmental Studies	EST	17944	01	--	02	01	50#*	20	--	--	--	--	25@	10
2	Electrical Circuits & Network	ECN	17948	04	01	02	03	100	40	50#	20	--	--	--	--
3	Industry Electrical Systems-I	IES	17949	03	01	02	03	100	40	--	--	25#	10	25@	10
4	Elements of Mechanical Engineering	EME	17950	02	--	02	02	50	20	--	--	--	--	25@	10
5	Computer Programming	CPR	17951	--	--	04	--	--	--	--	--	--	--	50@	10
			Total	**10**	**02**	**12**	--	**300**	--	**50**	--	**25**	--	**125**	--

Student Contact Hours Per Week: **24 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks : **550**

@ - Internal Assessment, # External Assessment, [ ] No Theory Examination, * Online Examination.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 ma sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms
- Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

Course Name : All Branches of Diploma in Engineering & Technology

Course Code : CI/CC/EG/EC/CL/GC/MG/MC/IL/XC

Semester : Fourth

Subject Title : Environmental Studies

Subject Code : 17944

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	01	50#*	--	--	25 @	75

#* Online Theory Examination

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding we are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

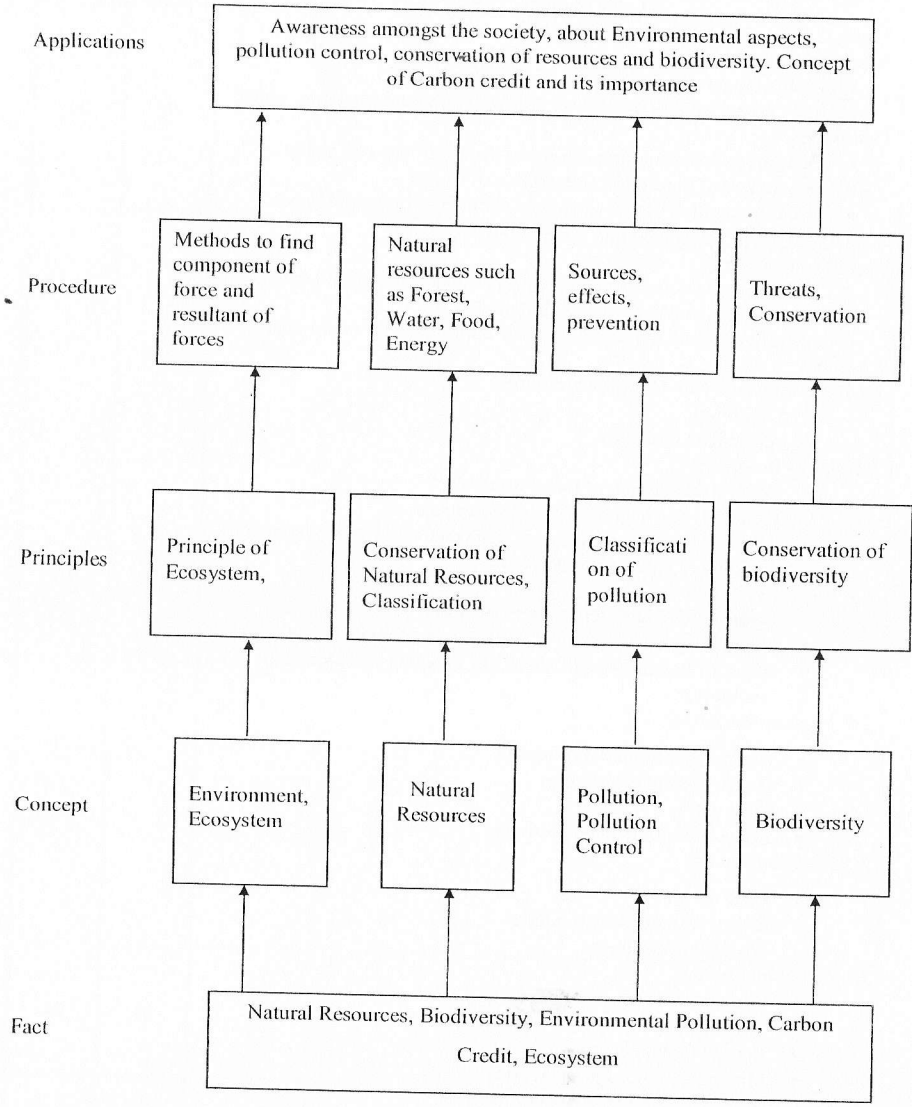
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

General Objectives: The student will be able to,

1. Understand importance of environment
2. Know key issues about environment
3. Understands the reasons for environment degradation
4. Know aspects about improvement methods
5. Know initiatives taken by the world bodies to restrict and reduce degradation

Learning Structure:



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

Theory:

Topic and Contents	Hours	Marks
Topic 1: Nature of Environmental Studies Specific Objectives: ➢ Define the terms related to Environmental Studies ➢ State importance of awareness about environment in general public **Contents:** • Definition, Scope and Importance of the environmental studies • Importance of the studies irrespective of course • Need for creating public awareness about environmental issues	01	04
Topic 2: Natural Resources and Associated Problems Specific Objectives: ➢ Define natural resources and identify problems associated with them ➢ Identify uses and their overexploitation ➢ Identify alternate resources and their importance for environment **Contents:** 2.1 Renewable and Non renewable resources • Definition • Associated problems 2.2 Forest Resources • General description of forest resources • Functions and benefits of forest resources • Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc. 2.3 Water Resources • Hydrosphere: Different sources of water • Use and overexploitation of surface and ground water • Effect of floods, draught, dams etc. on water resources and community 2.4 Mineral Resources: • Categories of mineral resources • Basics of mining activities • Mine safety • Effect of mining on environment 2.5 Food Resources: • Food for all • Effects of modern agriculture • World food problem	04	10
Topic 3. Ecosystems • Concept of Ecosystem • Structure and functions of ecosystem • Energy flow in ecosystem • Major ecosystems in the world	01	04
Topic 4. Biodiversity and Its Conservation • Definition of Biodiversity • Levels of biodiversity • Value of biodiversity • Threats to biodiversity	02	06

• Conservation of biodiversity		
Topic 5. Environmental Pollution • Definition • Air pollution: Definition, Classification, sources, effects, prevention • Water Pollution: Definition, Classification, sources, effects, prevention • Soil Pollution: Definition, sources, effects, prevention • Noise Pollution: Definition, sources, effects, prevention	03	08
Topic 6. Social Issues and Environment • Concept of development, sustainable development • Water conservation, Watershed management, Rain water harvesting: Definition, Methods and Benefits • Climate Change, Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust: Basic concepts and their effect on climate • Concept of Carbon Credits and its advantages	03	10
Topic 7. Environmental Protection Brief description of the following acts and their provisions: • Environmental Protection Act • Air (Prevention and Control of Pollution) Act • Water (Prevention and Control of Pollution) Act • Wildlife Protection Act • Forest Conservation Act Population Growth: Aspects, importance and effect on environment • Human Health and Human Rights	02	08
Total	**16**	**50**

Practical:
Skills to be developed:

Intellectual Skills:
1. Collection of information, data
2. Analysis of data
3. Report writing

Motor Skills:
1. Presentation Skills
2. Use of multi media

List of Projects:
Note: Any one project of the following:
1. Visit to a local area to document environmental assets such as river / forest / grassland / / mountain
2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
3. Study of common plants, insects, birds
4. Study of simple ecosystems of ponds, river, hill slopes etc

Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.

Learning Resources:
Books:

Sr. No.	Author	Title	Publisher
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

Course Name : Diploma in Electrical Engineering
Course Code : EG/EC
Semester : Fourth
Subject Title : Electrical Circuits and Networks
Subject Code : 17948

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	01	02	03	100	50#	--	--	150

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

In order to understand electrical machines, power system, controls and measurements, knowledge of electrical circuit and network is very important. Study of electrical network lays the foundation to understand subjects of application level.

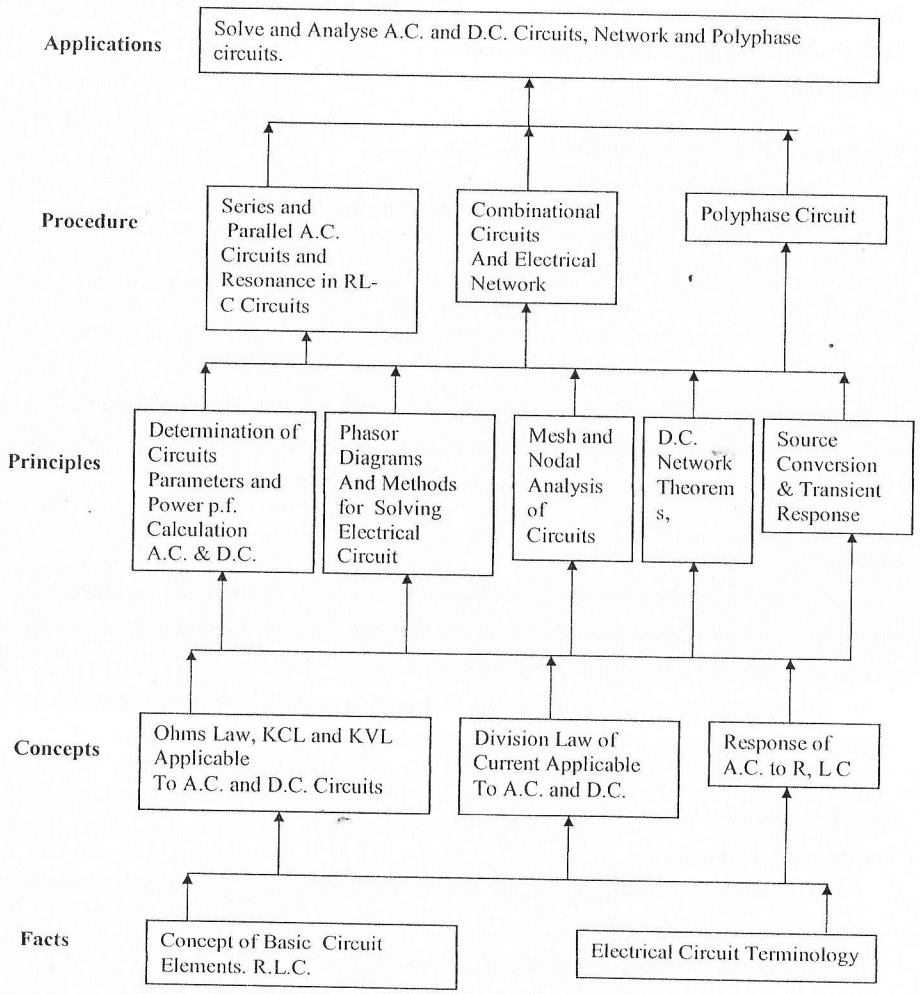
The study of this subject will facilitate student to understand concept and principles of circuits and circuit analysis. It helps also students in fault finding and troubleshooting.

General Objectives:

The student will be able to:

1) Understand basic elements of the circuit, terminology used and various quantities involved.
2) Use network theorems for solution of DC network.
3) Realize the importance of series ac circuit and parallel ac circuit.
4) Know the relations between phase and line values of various quantities in three phase ac circuit.
5) Calculate various parameters of a.c. circuits.

Learning Structure:



Theory:

Note: All Network Theorems should be taught for DC supply & Superposition Th should be taught for both AC & DC supply.

Topic and Contents	Hou
Topic 1. Review Of Basic Concepts Of Electric Circuit: Specific Objectives: ➢ Understand generation of a.c. supply and concept of phasor ➢ Define various terms related with a.c. supply. ➢ Draw sinusoidal a.c. waveform and phasor diagram. ➢ Calculate r.m.s., average ,instantaneous value and amplitude of a.c. supply. **Contents:** 1.1 Basic Electric Circuit Elements R, L, C. 1.2 Simple one loop a.c. generator to produce sinusoidal a.c e.m.f. 1.3 Sinusoidal a.c. waveform and definitions of various terms such as frequency, time-period, cycle, amplitude, average value, r,m,s value, crest factor ,form factor .**(Simple numericals)** 1.4 Concept of phasor. 1.5 Response of pure R, L, and C to sinusoildal a.c. supplies. 1.6 Phasor representation of alternating quantity and concept of phase angle.(Simple numericals)	06
Topic 2. Single Phase A.C. Series Circuits : Specific Objectives: ➢ Calculate current, reactance and impedance of series a.c. circuit. ➢ Draw phasor diagram of series a.c. circuit. ➢ Calculate various powers, and p.f. of series a.c. circuit. **Contents:** 2.1 Series a.c. circuits R-L, R-C and R-L-C circuits. Impedance, reactance, phasor diagram, impedance triangle, power factor, active(real) power, apparent power , reactive power, power triangle **(Derivations and Numericals).** 2.2 Series Resonance, quality factor **(Derivations and Numericals).** 2.3 Solution for AC Series circuit by using complex algebra.	12

Topic 3. Single Phase A.C. Parallel Circuits: Specific Objectives: The students will be able to : ➢ Calculate current, reactance and impedance of parallel a.c.circuit. ➢ Draw phasor diagram of parallel a.c.circuit. ➢ Calculate various powers, and p.f. of parallel a.c. circuit. **Contents:** 3.1 Parallel AC circuits ➢ Resistance in parallel with pure inductance. ➢ Resistance in parallel with capacitance. ➢ Series combination of resistance and inductance in parallel with capacitance Concept of Admittance, Conductance & Susceptance, Solution by admittance method and impedance method.**(Numericals only)** 3.2 Parallel resonance, quality factor. 3.3 Comparison of series and parallel circuits	08	12
Topic 4. Polyphase A.C. Circuits: Specific Objectives: ➢ Calculate current, reactance and impedance of each phase of polyphase a.c. circuit. ➢ Calculate line quantities. ➢ Draw phasor diagram of polyphase a.c. circuit. ➢ Calculate various powers, and p.f. of polyphase a.c. circuit. **Contents** 4.1 Advantages of polyphase circuits over single phase circuits 4.2Generation of three phase e. m. f. 4.3 Phase sequence, polarity marking. 4.4 Types of three-phase connections. 4.5 Concept of unbalanced load and balanced load. 4.6 Line, phase quantities and power in three phase system with balanced star and Delta connected load & their interrelationship.**(Derivations and numerical)**	10	18
Topic 5 : Principles of Circuit Analysis (ONLY DC Circuits): Specific Objectives: ➢ Realize importance of source transformations and λ /Δ orΔ / λ transformations. ➢ Solve examples of simple d.c. circuits by mesh or node analysis. **Contents:** 5.1Source transformation **(No Numericals).** 5.2Star/delta & Delta/star transformations **(No Numericals).** 5.3Mesh analysis **(Numericals with two equations).** 5.4Node analysis **(Numericals with two equations).**	08	12
Topic 6 : Network Theorems: **Note: Simple Numericals on DC Circuits only with maximum two simultaneous equations** Specific Objectives:	16	20

➢ Calculate the current in a given network by applying proper therom. ➢ Realize importance of maximum power transfer thermo. **Contents:** 6.1 Superposition Theorem for both AC Voltage & DC Source. 6.2 Thevenin's Theorem 6.3 Norton's Theorem 6.4 Maximum Power Transfer Theorem		
Topic 7 : Initial And Final Conditions Of Elements In A Network : Specific Objectives: ➢ Understand importance of initial and final conditions. ➢ Use such initial and final conditions in switching circuits and electronic circuits. **Contents** Concept of initial and final conditions in switching circuits. Meaning of t = 0 -, t = 0+ and t = ∞. R,L, and C at initial conditions R,L, and C at final conditions	04	
Total	**64**	1

Practical:

Skills to be developed:

Intellectual Skills:

1. Distinguish between series and parallel a.c. circuits
2. Interpret electrical circuit diagram.
3. Identify safety equipments required.
4. Decide the procedure for setting experiments.

Motor Skills:

1. Connect as per circuit diagram along with various required proper range meters.
2. Measure electrical current, voltage drop, power etc.
3. Select proper supply for a given experiment.(a.c. or d.c.)
4. Use safety devices while working.

List of Practicals:

All Experiments Are Compulsory.

1. To determine impedance, phase angle and plot phasor diagram of R-L a.c. series circuit. calculate also active, reactive and apparent power consumed in R-L series circuit
2. To determine impedance, phase angle and plot phasor diagram of R-C a.c. series circuit. calculate also active, reactive and apparent power consumed in R-C series circuit.
3. To determine impedance, phase angle and plot phasor diagram of R-L-C a.c. series circuit. calculate also active, reactive and apparent power consumed in R-L-C series circuit.
4. To obtain resonance in R-L-C a.c. series circuit either
   - ➢ By varying L or C or
   - ➢ By using variable frequency supply.
5. a. To measure current of each branch of R-C parallel a. c. circuit

b. To calculate p. f., active, reactive and apparent power taken by same R-C parallel a. c. circuit (Resistor in parallel with capacitor)

6. a. To measure current of each branch of RL-C parallel a. c. circuit
   b. To calculate also p.f., active, reactive and apparent power taken by the a. c. circuit. (Series connection of resistor and inductor in parallel with capacitor)
7. To verify line and phase values for balanced three phase load and to calculate all types of power.
   - Star connected
   - Delta connected
8. To verify superposition therom.
9. To verify Thevenin's and Norton's therom.
10. To verify maximum power transfer theorem.

Learning Resources:

1. **Books:**

Sr. No	Author	Title	Edition	Publisher
1	B. L. Theraja A. K. Theraja	A Text Book of Electrical Technology Vol-I (Basic Electrical Engg.)	Multicolour Edition 2005 And Subsequent Reprint	S. Chand & Co. Ramnagar New Delhi
2	V. N. Mittle	Basic Electrical Engg.	Any Edition After 2005	Tata McGraw-Hill
3	Edward Hughes	Electrical Technology	Second And Any Subsequent Edition	Pearson Education, New Delhi
4	A. Sudhakar	Circuit and network	Fourth Edition	Tata McGraw Hill
5	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
6	P.Ramesh Babu	Electric Circuits	First Edition	Scitech
7	Richard C. Dorf and James A. Svoboda	Electric Circuits	Sixth Edition	WILLEY student WILLEY INDIA Edition
8	Sunil T. Gaikwad	Basic Electrical Engineering	First Edition	Dreamtech Press 19-A Daryaganj, N.Delhi
9	David A. Bell	Electric Circuits	Seventh Edition	Oxford Univesity Press
10	K Murugesh Kumar	Elements of Electrical Engg.	First Edition	Vikas Publishing House Pvt Ltd. Noida

2. **Websites:**
   www.wikipedia.com , www.youtube.com , www.norsa.com, www.dreamtechpress.com

Course Name : Diploma in Electrical Engineering

Course Code : EG / EC

Semester : Fourth

Subject Title : Industrial Electrical Systems - I

Subject Code : 17949

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTA
03	01	02	03	100	--	25#	25@	150

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to entered in mark sheet under the head Sessional Work (SW).**

Rationale:

A diploma engineer is required to work as supervisor & knowledge worker in diffe organizations and is responsible to provide electrification. Maintain supply prepare des estimates, read drawing, IE rules, data tables, specification, for all types electrical installat Provision & maintaining earthing & all protective devices like MCCB,ELCB etc. Knowledge of maintenance, LT Lines, transformers, types of cables & wires are essential. H this core subject has been included at fourth semester in this curriculum.

General Objectives:

The Students will be able to: -

1. Read & interprets Electrical Installation drawings.
2. Understand & apply IE rules.
3. Make use of data tables & specification of wire, cables, LT lines & Distribu Transformer, MCCB, ELCB.
4. Understand principles & procedures of earthing.
5. Know basic terms to prepare design & estimate of installation.
6. Understand & apply procedures for contracts & tenders.

Learning Structure:

Application:

Estimating & costing of Residential, Commercial & Industrial Electrical Installation and prepare tendering documents, Testing of Electrical Installation and Evaluation & billing of executed work

Procedure:

Tender & Tendering documents

To prepare the schedule of Material

Costing of Material, Labour, Overhead, contingencies

Selection of Rating and Size of conductor & Conduit, main switch, Distribution board, Bus bar etc., Selection & Rating of protective devices & ear thing of Installation, Selection & Rating of Accessories required for Installation

Testing of Electrical Installation as per IS

Execution of work as per plan

Circuit design and wiring design procedure for each type of Installation

Position of equipment in Installation, Deciding the path of wiring cable and conduit & ear thing

Principles

Design consideration of Electrical Installation, Principles of circuit design for each type of Installation, Principles of execution of work

Concepts

Residential, commercial and Industrial wiring, Lighting and power circuit, wires, cables, overhead and underground wiring, earthing

Facts

Electrical Engineering Drawing, IE rules applicable to Residential, Commercial & Industrial Installation, General rules & Guidelines for Residential, Commercial & Industrial Installation, Data tables of conductor, Material and Accessories, Various plans & diagrams related to electrical Installation

Theory:

Topics and Contents	Hours	Mar
1. Drawings and IE rules Specific Objectives ➢ Understand different types of electrical Installation ➢ Know and read Electrical drawings & symbols ➢ Know IE rules --- • Classification of electrical installations • General requirements of electrical installation • Reading & interpretation of electrical engineering drawings & symbols related to installations • Representation of different types of diagrams, such as schematic, circuit, wiring diagram and its single line representation as per IS code. • IE rules related to electrical installation	04	10
2. Service connections Specific Objectives ➢ Select appropriate method for service connection ➢ Differentiate between various service connections --- • Concept of service connection • Types of service connections and their features • Methods of installation of service connection • Differentiate between underground and overhead service connection • Service connection for 11 KV H. T. Consumer	04	10
3. Electrification of residential Installation Specific Objectives ➢ Select wires and wiring methods as per the requirement ➢ Prepare comparison chart of various wiring accessories ➢ Use given guidelines for residential installation ➢ Calculate total electrical load --- • Types of wires and wiring methods as per IS No. • General rules and guidelines for installation of residential electrification and positioning of equipments • Calculation of total electrical load in the residential installation • Procedure for the design of number of sub circuits • Method of drawing single line diagram • Selection of type of wire and wiring method • Load calculation and selection of size of wire by considering overload and future expansion • Determine length of batten and length of wire • Selection of rating for main switch, distribution board ,MCB,ELCB, and wiring accessories • Purpose of earthing and types of earthing • Determine length and size of earth wire • Prepare list of material for residential installation with their costing • Total estimation and costing of overall residential installation with proper cost of material , labour charges , contingencies charges • Determine per point charges • Wiring diagram for residential installation: Single Line and multiline	12	24

representation.		
4. Electrification of Commercial Installation Specific Objectives ➢ Difference between residential and commercial installation ➢ Prepare comparative chart for different ratings, size & other technical specifications from manufactures/ dealers. ➢ Use given guideline for commercial installation ➢ Collect various specifications of wiring material • Concept of commercial installation • Difference between residential and commercial installation • Difference between wires and cables • Types of cables required for commercial installations according to size and core • General requirements and selection factors for commercial installation • Load calculation and selection of size of service connection and nature of supply • Decide number of lighting and power sub circuits as per the IE rule • Decide size of wire/cable required for every sub circuit • Decide length of wire required for every sub circuit • Draw the single line diagram • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB etc. • Decide proper method of earthing for commercial installation • Prepare list of material for commercial installation with their costing • Draw the single line diagram • Find out the estimation chart with proper cost of material , cost of labour, contingencies charges and profit margin • Draw the circuit diagram	12	20
4. Electrification of Industrial Installation Specific Objectives ➢ Based on criteria for selection decide if the installation is industrial installation ➢ State difference between power wiring and actual industrial wiring ➢ Guideline for industrial installation ➢ Calculate detail estimate and costing of industrial installation • Concept of industrial load • Concept of motor wiring circuit and single line diagram • Guidelines about power wiring and motor wiring • Design considerations of electrical installation in small industry/factory/workshop • Machine current calculations • selection of size for wires , cables required for the machines and its controlling unit • Decide length and size of cable required for the every industrial load • Decide ratings of wiring accessories, main switch, bus bar MCB, ELCB etc. for every industrial load. • Decide proper method of earthing for industrial installation • Prepare list of material for industrial installation with their costing • Find out the estimation chart with proper cost of material , cost of labour,	12	24

contingencies charges and profit margin • Draw the circuit diagram		
6. Contracts, Tenders and Execution Specific Objectives ➢ Draft tender documents ➢ Fill tender documents following appropriate procedure and be present and act as per the requirements and rules while opening of the tender. ➢ Prepare billing • Concept of contract and tenders • Types of contracts and contractors • Types of tenders • Requirements of valid contract and good contractor • Tender notice • Procedure for submission and opening of tenders • Comparative statements for selection of contractors • Principles of execution of work • Billing of executed works.	04	12
Total	**48**	**100**

Tutorials:

1. Electrical installation scheme for small bungalow or house. Draw wiring diagram a prepare detailed estimation and costing.
2. Electrical installation scheme for commercial building/ floor mill. Draw wiring diagram a prepare detailed estimation and costing.
3. Electrical installation scheme for small industry/factory/workshop/agriculture pump . Dra single line diagram and prepare detailed estimation and costing. Draw the circuit diagram

Assignments:
Skills to be developed:

Intellectual Skills:

1. Identify and apply different designing methods as per the requirements
2. Select proper ratings
3. Ability to analyse and select appropriate methods for estimation and costing

Motor Skills:

1. Drawing skill.
2. Measuring dimensions

List of Assignments: Problems & sheets on following topics.

1) Electrical estimation & design of residential consumers (for flats/Bungalows/Row houses)
2) Electrical estimation & design of Commercial consumers (for Malls/Colleges/Hospita Banks)

3) Electrical estimation & design of Agricultural consumers (Pump jets/submersible pump)

4) Electrical estimation & design of small & medium Industrial consumers.

5) Electrical Installation & layout preparation of your college campus.

6) Preparation of a NIT (Notice Inviting Tender)

Note: Estimations be made for loads up to 100 KVA

Learning Resources:

1. **Books:**

Sr. No.	Name of the Author	Title of the book	Name of the Publisher
1	J.B.Gupta	Electrical Installation Estimating & costing	S.K.Kataria & sons New Delhi
2	Raina Bhattachraya	Estimating dsign & costing	New Age
3	Allasappan & Ekambarm	Estimating design & costing	Tata McGraw hill
4	S L Uppal	Estimating & costing	Khanna Publiser
5	Surjit Singh	Electrical Estimating & costing	Dhanpat Rai & co.

2. **ISO, IS, BS standards, Data Sheets, IE Rules Handbook**
   IS/International code: IS5909, 7733, 2174, 732, 4648

3. **Charts, Models, CDs, Transparencies,**

4. **Websites:**
   http://www.bestestimatepro.com/
   bieap.gov.in/estimatingandcosting.pdf
   http://indiacatalog.com/web_directory/electrical/electrical.html

Course Name : Diploma in Electrical Engineering

Course Code : EC / EG

Semester : Fourth

Subject Title : Elements of Mechanical Engineering

Subject Code : 17950

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	--	--	25@	75

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to b entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Electrical engineering is the basic engineering branch. Electric power supply is needed fo running of mechanical and the chemical process equipment for which different electric motors ar used, so in mech industry, the electrical engineer has to take care of various electrical installation with its maintenance.

The electrical engineer has to look after various aspects related to electrical engineering i respect of mechanical equipment. (Boilers, Steam turbine, steam engines)
There are the equipments that are used for generation of electrical power.

The content on boiler, steam turbine, and stem engine will enable the electrical engineer t adopt appropriate electrical engineering support for the efficient use of these equipments.

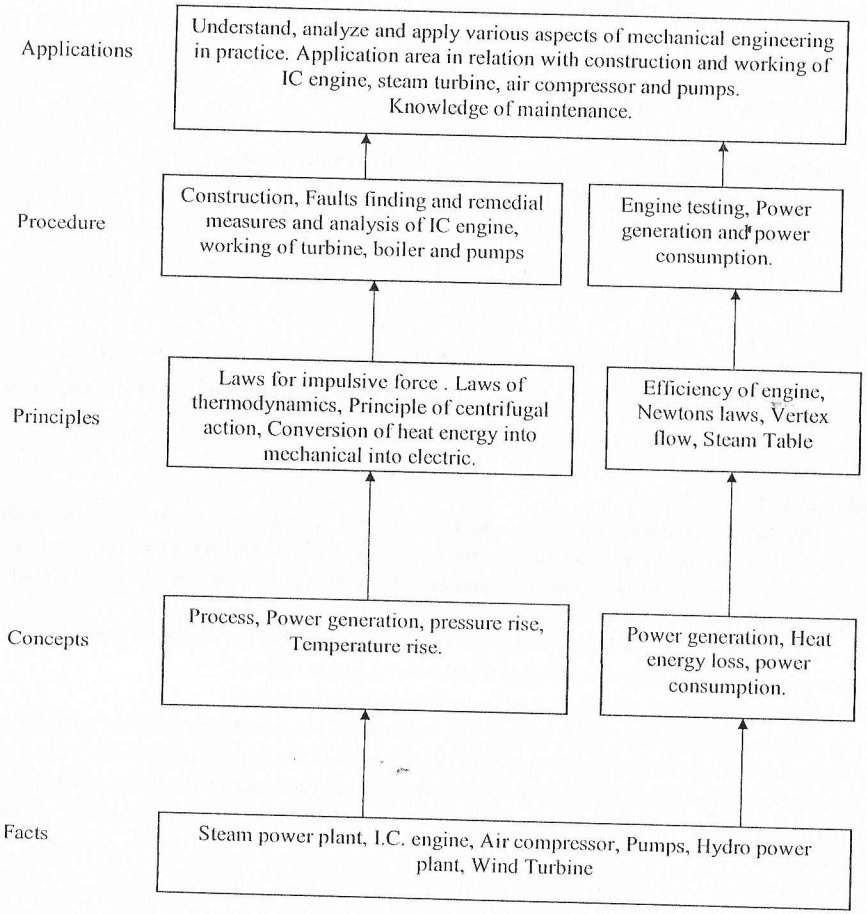
Topics on air compressors and pumps, turbine also provide necessary guide line in respect o electrical engineer. For trouble free working of these equipment with saving ion energ consumption.

General Objectives:

Students should be able to

1. Know the function of different mechanical equipment along with their location.
2. Understand working of high pressure boilers and steam turbine and thermal power plant.
3. Know the operation and control of fuel and steam supply.
4. Enlist sources of waste heat from boiler, IC engine.
5. Describe internal combustion engine.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Boilers, Steam turbines, Steam engine **Specific Objectives:** ➢ Calculate the properties of two phase system by using steam table ➢ Explain construction & working of boilers ➢ Identify the heat losses & malfunctioning of boilers **Contents:** 1.1 Construction and working of critical and super critical boilers. 1.2 Boiler efficiency 1.3 Boiler Act (for remedial measure). 1.4 Classification of turbines. 1.5 Impulse and reaction turbine. 1.6 Power developed by turbine. 1.7 Different power losses in turbine.	10	16
Topics 2: I.C. Engines **Specific Objectives:** ➢ Calculate performance of engine ➢ Identify the malfunctioning Causes **Contents:** 2.1 Classification of I.C. engines. 2.2 Testing and performance of I. C. engines. ➢ Break power ➢ Indicated power ➢ Frictional power 2.3 Fault finding and remedial action. 2.4 Starting motor of I.C. engine.	06	10
Topic 3: Air Compressor **Specific Objectives:** ➢ Know the working principles of air compressor ➢ Identify Methods of energy saving ➢ Identify the fault & suggest remedies **Contents:** 3.1 Introduction 3.2 Definition : Compression ratio, Compressor capacity, Free air Deliver, swept volume. 3.3 Reciprocating and rotory air compressor, their working and Construction. 3.4 Methods of energy saving in compressor. 3.5 Fault finding and remedial action.	08	12
Topic 4: Pumps **Specific Objectives:** ➢ Selection of pumps for various applications ➢ Know the construction & working of pumps ➢ Identify the trouble shooting of IC engines **Contents:** 4.1 Classification of pumps. 4.2 Type of pumps and their working. 4.3 Power required to run the pump. 4.4 Fault finding and remedial action.	08	12
Total	**32**	**50**

Practical:
Skills to be developed:

Intellectual Skills:

1. Understand vapour process of steam boilers & different mountings & accesories
2. Analyze the performance of pumps& turbines

Motor Skills:

1. Use pressure & temp measuring device
2. Operate I C Engine & know the working of dynometers

List of Practicals:

(1)Write a report on visit to Sugar factory/steam power plant consisting of
(a)Working of boiler (b) Working of turbine (c) Foundation of boiler.

(2) Write a report on visit to Sugar factory/steam power plant to observe
(a) Operation of condenser (b) Operation of cooling tower.

(3) To determine brake power of single cylinder diesel engine by conducting trial on it.

(4) To determine overall efficiency of a centrifugal pump by conducting a trial test on it and observe foundation of pump.

(5) Observe the operation of air compressor for identification of sources of air leakage.

(6) Observe the operation of reciprocating pump and identify types of faults and suggest remedial measures.

Learning Resources:
1. Books:

Sr. No.	Author	Title	Publisher
1	Domkundwar V. M	A Course In Thermal Engg.	Dhanpat Rai & Co.
2	R. K. Bansal	Fluid Mechanics & Hydraulic Machine	Laxmi Publication
3	T. S. Rajan	Basic Mechanical Engg.	New Age International
4	Dr. Kripal Singh	Automobile Engineering	Standard Publishers Distributers
5	R. S. Khurmi	A Text Book Of Thermal Engineering	S Chand & Co. Ltd
6	C. M. Agrwal	Atext Book Of Thermal Engg	Wiley Precise Text Book

Course Name : Diploma in Electrical Engineering
Course Code : EG
Semester : Fourth
Subject Title : Computer Programming
Subject Code : 17951

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	50@	50

Rationale:

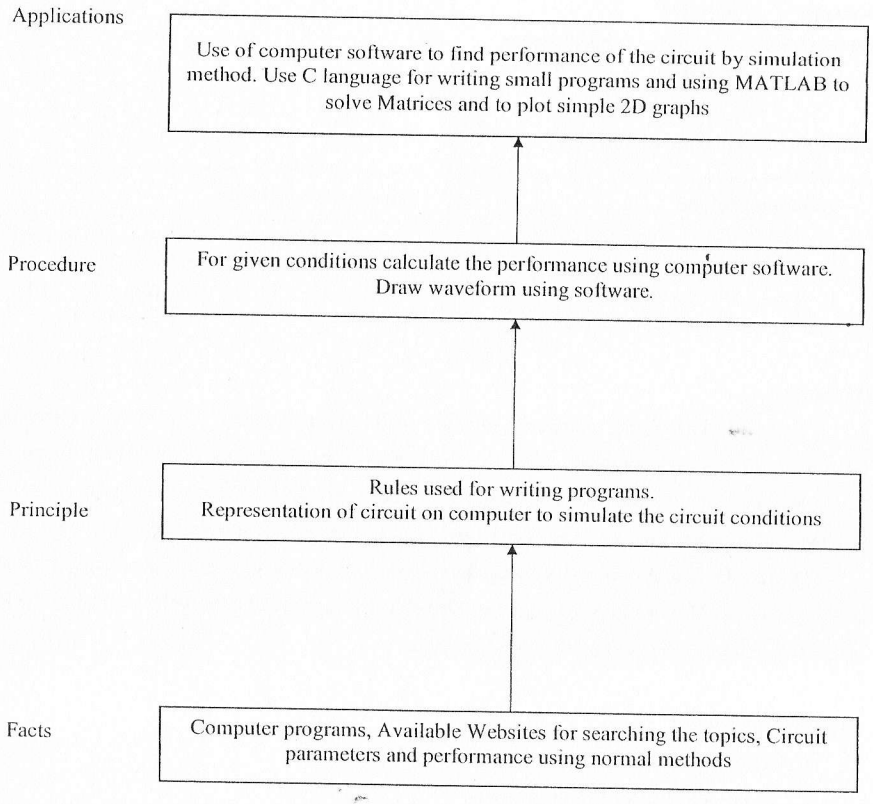
For any engineering, computer software skills are mandatory. Computer has becam important part of any learning process. Therefore, it is necessary for any engineering student t have basic idea about computer languages. 'C' is most widely used general purpose powerful efficient and compact language. This subject covers C as a basic logic development language.

MATLAB is said to be the language of engineers. It is widely used in mathematics, scienc and engineering. The MATLAB is used in this subject to solve common mathematical problem and to write simple program to plot simple graph.

General Objectives:

1. Describe concepts, variables and constants.
2. Write simple input/output program.
3. Write simple programs related to condition handling.
4. Write a program related to looping.
5. Understand concept of function.
6. MATLAB as a mathematical problem solving tool.
7. To draw 2 D plots using MATLAB.

Learning Structure:



Theory:

Note: Theory to be completed in the allotted practical hours.

Topic and Contents
Topic 1: **Basics of C** ➢ History of C. ➢ C character set, tokens, variable, constant, keywords, data types ➢ Operators (Arithmetic, Relational, Logical). ➢ Formatted input, output statement (printf, scanf).
Topic 2: **Decision Making** ➢ Decision making using If-Else statement, switch case statement,. ➢ Decision making using loop statements like while, do-while, for.
Topic 3: **Arrays** ➢ Declaring one dimensional array, simple programs on arrays such as largest of array, sorting array.
Topic 4: **Functions** ➢ Necessity of functions, defining user defined functions, calling functions, call b value, call by reference
Topic 5: **MATLAB Environment** ➢ Command window, Command history, Workspace, Edit window, Help window ➢ Elementary built in functions.
Topic 6 **Matrices in MATLAB:** ➢ Entering data in Matrices ,Matrix Subscripts /Indices, Some useful commands related to Matrices such as det, rank, trace, inv, norm, transpose, zeros, ones, ey arithmetic operations on matrices ,arrays, Relational operators
Topic 7 **Programming in MATLAB & Graphics** ➢ MATLAB editor: Creating M Files Function subprograms ➢ 2 D PLOTS : printing labels, grid and axes box, entering text in a plot , axis control ➢ Multiple plots :using plot , hold ,line commands ➢ Specialized 2 D plots using Polar, area, bar, hist, pie, stem function
Topic 8 **Fundamentals of Simulink** ➢ Simulink Modelling : Collecting blocks to create a model , modifying block parameters, labeling blocks, commonly used blocks

STATE BOARD OF TECHNICAL EDUCATION MAHARASHTRA

Note:

1. **Related theory as mentioned above will be taught while performing the respective practicals.**
2. **The term work will consist of print outs of programs developed by the students in the laboratory.**

(The teacher shall ensure that each student actually performs the practical before taking the print outs.)

Practical:
Skills to be developed:

Intellectual Skills:

1. To understand the output of a program.
2. To understand and use the conditions in a program.
3. To understand the idea of a loop
4. To read and initialize the array
5. To analyze the program

Motor Skills:

1. Ability to operate a keyboard and machine
2. Ability to edit and debug a program
3. Ability to compile and execute the program
4. Ability to write a programs using Library functions

List of Practical:

1. Write a program to display a number in decimal, octal and hexadecimal form by using different format specifies.

2A. Write a program to display largest of three integer numbers.

2B. Write a program to display remarks such as distinction, first class, second class, pass class and fail according to the marks.

3. Write a program for arithmetic operations such as addition, subtraction, multiplication and division of two numbers using switch case statement.

4. Write program to display reverse of a given number using for loop.

5A. Write a program to display multiplication table of a given number using do while loop.

5B. Write a program to display sum of first n numbers using while loop.

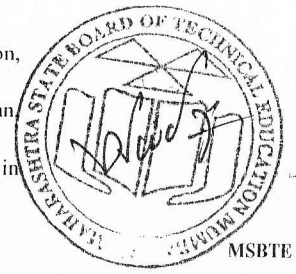
6. Write a program to accept one dimensional array and display the array in ascending order.
7. Write a program to swap two numbers using call by value, call by reference.
8. Understand commands in MATLAB. (General, Directory, Workspace, Termination, Help)
9. Use MATLAB to enter a data in matrix and practice the functions such as sum, mean, length, max and min.
10. Understand special matrix functions such as zeros, eye, ones, det, inv and find in MATLAB.

11. Write commands to create two matrices of 3 * 3 size and perform addition, subtraction, multiplication, right division, left division using MATLAB.
12. Write a program in MATLAB to plot a curve given by equation y = sin(x), y=cos(x), $y=x^2$ (Use hold command)
13. Write a program in MATLAB to illustrate the use of subplot command.
14. Create a Simulink model to verify Ohm's Law.

Learning Resources:
1. Books:

Sr. No.	Author	Title	Publisher
1	Balgurusamy	Programming in ANSI C	Tata McGraw Hill
2	Harshal Arolkar Sonal Jain	Simplyfying C	DreamTech
3	Kashi Nath Dey Samir Bandopadhyay	C programming Essentials	Pearson
4	Bansal Goel Sharma	MATLAB & its application in Engineering	Pearson
5	Agam Kumar Tyagi	MATLAB and Simulink	Oxford
6	K K Sharrna	MATLAB Demystified	Vikas
7	Amos Gilat	MATLAB an Introduction with application	Willey India Edition

2. Websites: www.vikaspublishing.com/teachersmanual.aspx



MSBTE – Final Copy Dt. 05/03/2014 28 17951 EC/EG4