

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Switchgear and Protection
Subject Code : 132EE61

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		Practical		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	3	3	80	32	20	100	40	-	-	25	10	25	10	150

Rationale:

In modern world electrical power system is growing fast due to expanding technical activities. As such the students must know about the switchgear and protection system. It is expected that the knowledge of facts, concepts, principles & procedural aspects of switchgear and protection system must be known by students which ultimately help the students in discharging their duties as a supervisor or a technician in substations , manufacturing industries & public service utilities.

Objectives:

The students will be able to :

- 1) Learn the principles, concepts & procedural aspects of switchgear & protection .
- 2) Identify the various components of switchgear & protection systems.
- 3) Know the specifications & select switchgear & protection system
- 4) Identify the faults & repairs

Syllabus

Part I:- Theory

Sr. No	Contents	L	M
	Section I		
1	Fundamental 1.1 Necessity & functions of protective system. 1.2 Normal & abnormal conditions. 1.3 Types of faults & their causes. 1.4 Short circuit calculations(Symmetrical faults only) 1.5 Use of current limiting reactors & their arrangements	04	07
2	Circuit interrupting devices 2.1 HRC fuses - construction, types, working, characteristics, election and applications. 2.2 Isolators- vertical break, horizontal break & pento-graph type 2.3 Arc formation process, methods of arc extinction, related terms. 2.4 Circuit breakers- Concept, Classification, Working principle, Construction, Specification of the following H.T - Bulk oil circuit breaker, Minimum oil circuit	09	14

	<p>breakers(MOCB). Sulpher Hexa Fluoride circuit breaker (SF6). Vacuum circuit breaker. Air circuit breakers (ACB), Mminiature circuit breakers (MCB), Moulded case circuit breakers (MCCB), Earth leakage circuit breaker (ELCB) or (RLCB), Comparison of fuse & MCCB</p>		
3	<p>Protective Relaying 3.1 Requirements- relay time, related terms. 3.2 Classification - Electromagnetic attraction, induction static, μP based relays. 3.3 Protective transformers. (No numerical on above topic.) 3.4 Over current relay-Time current characteristics. 3.5 Static over current relays 3.6 μP based over current relays. 3.7 Distance relaying- Principle, static, μP based 3.8 Directional relay. 3.9 Differential Relay. (Simple numerical on relay setting)</p>	07	13
4	<p>Protection of Alternator 4.1 Abnormalities & Faults 4.2 Differential protection 4.3 Overcurrent , earth fault, interturn fault, negative phase sequence, over heating protection. 4.4 Reverse power protections. (Simple numerical on differential protection</p>	04	06
Section II			
5	<p>Protection of Transformer 5.1 Abnormalities & faults. 5.2 Differential, over current, earth fault, interturn, restricted earth fault, over heating protection. 5.3 Buchholz relay (Simple numerical on differential protection</p>	06	09
6	<p>Protection of Motor 6.1 Abnormalities & faults. 6.2 Short circuit protection, Overload protection, Single phase preventer.</p>	05	09
7	<p>Protection of Busbar & transmission line 7.1 Abnormalities & faults. 7.2 Bus bar protection. 7.3 Transmission line, over current, distance protection. Pilot wire protection.</p>	05	08
8	<p>Neutral Earthing 8.1 Introduction & importance. 8.2 Types of earthing 8.3 substation earthing</p>	04	08
9	<p>Over voltage Protection</p>	04	06

	9.1 Causes of overvoltages. 9.2 Lighting phenomena & over voltage due to lightning. 9.3 Protection of transmission line & substation from direct stroke. 9.4 Types of lightning arresters & surge absorbers & their Construction & principle of operation. 9.5 Protection against traveling waves. 9.6 Insulation co-ordination		
	Total	48	80

Part II : Practicals:

Skills to be developed:

Intellectual Skills:

1. Identify different types of circuit breakers
2. Identify various faults on the system
3. Calculate the fault levels

Motor Skills:

1. Simulate circuit configuration to create various faults
2. Set the relays for various fault levels

List of Laboratory Experiments:

- 1) Identify the components of different types of circuit breakers with their specifications (through visits , video or model).
 - i) Low tension air circuit breaker.(including protective devices)
 - ii) Minimum Oil Circuit Breaker (M O C B)
 - iii) Miniature Circuit Breaker (M C B)
 - iv) Moulded Case Circuit Breaker (M C C B)
 - v) Earth Leakage Circuit Breaker (E L C B) or Residual Leakage Circuit Breaker (R L C B)
 - vi) Sulphur - Hexa fluoride circuit breaker (S F 6)
 - vii) Vacuum Circuit Breaker.
- 2) Plot performance characteristics of over current relay.
- 3) Simulation of alternator protection.
- 4) Simulation of transformer protection.
- 5) Comparative study of specifications of earthing at different substations / different locations & new trends in earthing schemes (information search)
- 6) Comparative study of specification of lightning arresters of different manufacturers through Brochures / Literature
- 7) For a given 3-ph induction motor with D.O.L. starter
 - a). Check the operation of overcurrent relay for various loads.
 - b). Check the operation of single phasing preventer by creating single phasing fault.
 - c). Check the operation of D.O.L. starter under short circuit condition

Learning Resources:

Text Book:

Power System Protection and Switchgear, 1st Edition by Ram, Badri, Tata McGraw-Hill.

Reference Books:

- 1) Switchgear Protection and Power Systems, 2008 Edition by Sunil S Rao, Khanna Publishers.
- 2) Switchgear and Protection, 1st Edition by U A Bakshi, Technical Publications, Pune.
- 3) Switchgear and Protection, 1st Edition by Deshpande M, Tata McGraw-Hill.
- 4) Switchgear and Protection, 2nd Edition by Haroon Asfaq, Khanna Publishing Book Company (P) Ltd.
- 5) Switchgear and Power System Protection, Singh, Ravindra P, PHI Publications.

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Power Electronics & Drives
Subject Code : 132EE62

Teaching and Examination Scheme:-

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		Practical		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	3	3	80	32	20	100	40	50	20	-	-	25	10	175

Rationale:-

The field of electrical engineering is generally segmented into three major areas –Electronics, Power and Control. Power Electronics involves a combination of these three areas. In broad terms, the function of power electronics is to process and control the electrical energy by supplying voltage and current in a form that is optimally suited to the load. Now a day’s electrical machine are controlled by Power Electronics methods. Also the various conventional control & relays are replaced by electronic control & relays, employing solid state power semiconductor devices. Hence, for electrical engineering Students it is desirable to study the course dealing with Power Electronics. This subject belongs to technology area.

Objectives:-

The students will be able to:

1. Draw the circuit diagrams and explain the working of controlled rectifiers with appropriate waveforms.
2. Draw the circuit diagrams and explain the working of different types of Inverters with appropriate waveforms.
3. Explain the Voltage and Frequency Control Methods used in Inverters.
4. Draw the circuit diagrams and explain the working of different types of choppers with appropriate waveforms.
5. Apply the power electronic methods of controls in Electrical Engineering field.

Syllabus

Part I:- Theory

Ser. No	Contents	L	M
	Section I		
1	Power Electronics Devices: Power Mosfet, SCR, Triac, IGBT, Diac, PUT, their characteristics. Two transistor analogy of SCR. Turn ON methods of Thyristor: Forward Voltage triggering, Gate triggering, dv/dt triggering, thermal	06	10

	<p>triggering of thyristor, pulse triggering. Line synchronization of gate pulses, SCR triggering using PUT, Pulse Transformer and Diac. Gate Trigger circuits. Introduction to Snubber Circuit Turn OFF (Commutation) methods of Thyristor: Class A, B, C, D, E, F.</p>		
2	<p>Converters: Overview of 1-Φ half & full wave converters. (with R, RL loads & FWD). Overview of Fully Controlled Bridge Converter (With R & RL Load). Comparison of 3-phase and 1-phase Converters. Cycloconverters: 1- Φ & 3- Φ, Principle of Operation, Input / Output Waveforms</p>	09	15
3	<p>Inverters: Introduction Classifications: 1 & 3 Phase, Line & Forced commutated Inverters, Series Parallel and Bridge Inverters Series Inverter: Operation of Basic Series Inverter Circuit, Modified Series Inverter. Parallel Inverter: Operation of Basic Parallel Inverter Single Phase Bridge Inverter: Half and Full Bridge Inverter Output voltage control by sinusoidal PWM</p>	09	15
Section II			
4	<p>Dynamics Of Electrical Drives & Braking: Types of loads, Load torque Quadrantal diagram of speed torque characteristic. Dynamics of motor-load combination. Electric Braking: Types of braking. Braking while lowering of load and stopping. Electric braking of dc and induction motors</p>	06	10
5	<p>Choppers: Introduction Principle of Chopper Control Techniques: Constant Frequency System, Variable Frequency System Classification of Choppers: Class A, Class B, Class C, Class D and Class E (Quadrant operations)</p>	09	15
6	<p>Drives Application in Power Electronics: DC Drives: Speed control & Braking operation of DC separately/shunt/series motor with single phase and three phase half and full controlled converter, Chopper Drives. AC Drives: Methods of speed control of three phase Induction Motor. Speed control and braking operation by using converters and choppers.</p>	09	15
Total		48	80

Part II:- Practicals

List of Laboratory Experiments:

- 1) To study and plot the characteristics of SCR.
- 2) To study and plot the characteristics of DIAC.
- 3) To study and plot the characteristics of TRIAC.
- 4) To study and plot the characteristics of PUT
- 5) SCR firing circuit using PUT
- 6) 1-Phase Filament Lamp Light Dimmer using TRIAC.
- 7) Single Phase Half & Full wave converter (with R, RL, RL and FWD load).
- 8) Three Phase Converter with R & RL load.
- 9) MOSFET inverter
- 10) Parallel Inverter
- 11) Modified Series Inverter
- 12) Half Bridge and Full Bridge Inverter.(R,RL, underdamped & overdamped loads)
- 13) Step down and Step up variable dc supply by using chopper circuit.
- 14) Speed control of separately excited dc motor by using type A chopper circuit.

B) Mini project:

- 8) Develop single phase light dimmer circuit using Diac and Triac.

Learning Resources:

Text Books:

- 1) Power Electronics, by Dr. P S Bimbhra, 6th Edition, Khanna Publishers.
- 2) Electric Drives by M Chilikan, Mir Publishers.
- 3) A first course on electric drives by S K Pillai, 2nd Edition John Wiley Publication.

Reference Books:

- 1) Power Electronics, 2nd Edition by Khanchandani, Singh, Tata McGraw-Hill.
- 2) Power Electronics: Circuits, Devices and Applications, 3rd Edition,
by M H Rashid, Pearson
- 3) GEC SCR Manual, 6th Edition

Websites:

Laboratory Experiments Manual:

- 1) <http://www.ssit.edu.in/dept/assignment/pelabmanual.pdf>
- 2) http://www.ee.iitgp.ernet.in/faci_pe.php
- 3) http://www.ece.umn.edu/groups/power/labs/pe/pe_manual.pdf

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Electrical Estimation & Costing
Subject Code : 132EE63

Teaching and Examination Scheme:-

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	3	3	80	32	20	100	20	-	-	50	20	25	10	175

Rationale:-

Electrical Diploma holders work as technicians/supervisors for electrical installation of various companies, industries and residential buildings. Knowledge of electrical drawing, estimation and costing methods is therefore essential.

Objectives:-

1. The students will be able to:
2. Define and state different types of electrical installations and IE rules.
3. Explain the sequence to be followed in electrical installation of residential, commercial and industrial buildings.
4. Understand the concept of contract and tendering.

Syllabus

Part I:- Theory

Ser. No	Contents	L	M
Section I			
1	Introduction: Electrical schedule, catalogues, market survey and source selection, estimate recording, determining required quantity of material, labor conditions & contingencies, overhead charges, profit, purchase enquiry & orders, payment of bills, tender form, general idea of IE rules, Indian Electricity Act.	06	10
2	Electrification of Residential Building: Wiring guidelines and positioning of equipments, single line diagram drawing, proper selection of wire and cable ratings, load calculations and selection of conductor type, proper selection of main switch, distribution board, ELCB, MCB & wiring accessories. Importance of earthing, earthing installation. Preparation of estimate	09	15
3	Electrification of Commercial Installation: Planning and design considerations, load calculations and selection of service	09	15

	connection and nature of supply, determination of cable size, busbar and busbar chambers, mounting and positioning of main switch, switch and distribution board, earthing, wiring system layout. Preparation of estimate.		
Section II			
4	Electrification of Factory Unit Installation: Concept of Industrial load, motor wiring system and single line diagram. Motor current calculations, proper selection of rating of cable/wire size and conduit. Concept of cable routing, determining the wire length, proper earthing. Proper sequencing of preparing the estimation. Case study of small factory unit or workshop.	10	18
5	Testing of Installation: Testing of wiring installation for current verification, earthing, continuity and insulation resistance as per IS standards.	06	10
6	Contracts, Tenders: Contract types, contract documents, Contractors, Tender and Tender notices. Procedure of tender submission and opening. Comparative statements and method for selecting proper contractors. Principle of execution of work, Technical sanctions and billing of executed work.	08	12
Total		48	80

Part II:- Practicals

Drawing sheets should be prepared by the students with detailed wiring diagram, Electrical installation, estimation and costing work for the following:

- 1) Residential Building.
- 2) Commercial Office Building.
- 3) Workshop (Gala unit).
- 4) Small factory.
- 5) Shopping mall.

Learning Resources:

Text Books:

- 1) Electrical Wiring, Estimation and costing by S L Uppal, Khanna Publishers.

Reference Books:

- 1) Electrical wiring and estimation by B D Arora, R B Publications, New Delhi.
- 2) Electrical estimation and costing by Surjit Singh, Dhanpat Rai & Sons Publication.
- 3) Electrical design, estimation and costing by K B Raina and S K Bhattacharya, New Age International Publication Limited, New Delhi.

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Electric Traction
Subject Code : 132EE64E1

Teaching and Examination Scheme:-

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		Practical		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	2	3	80	32	20	100	40	-	-			25	10	125

Rationale:

Electric traction means a locomotion in which the driving force is obtained from electric motors. One of the practical applications of electricity, which enters into the everyday life of many of us, is its use in service of mass transport – the electric propulsions of vehicles – electric trains, trolley buses, tram cars and in the latest developments such as metro and sky bus. In view of the growing importance and technological developments, which have come about in this area in the recent past; for Electrical Engineering students, it is desirable to study the course dealing with electric traction. This subject belongs to technology area.

Objectives:

The students will be able to,

- (1) List and explain different equipments used in the power circuit and auxiliary circuit of electric locomotives.
- (2) Explain importance of maintenance of electric locomotive.
- (3) State and explain functioning of the protection systems used in electric locomotives.
- (4) Describe the recent trends in electric traction; such as, LEM propelled Traction.
- (5) Appreciate the use of computers in electric traction management.

Syllabus

Part I:- Theory

Sr. No	Contents	L	M
	SECTION- I		
01	Power Supply Arrangements: Introduction, High Voltage Supply, Constituents of Supply System, Substations, Feeding Posts, Feeding and Sectioning Arrangements. Sectioning and Paralleling Post, Sub sectioning and Paralleling Post. Sub sectioning Post, Elementary Section, and Miscellaneous Equipments at Control Post or Switching Stations, Major Equipments at Substation. Transformer. Circuit Breaker. Interrupter, Protective System for AC Traction	04	10

	Transformer Protection and 25 KV Catenary Protection, Location and Spacing of Substations,		
02	<p>Electric Locomotives Nomenclature used For Electric Locomotives, Types of Electric Locomotives By Nomenclature, AC Locomotive: Equipments of AC Electric Locomotive, Power Circuit Equipments and Auxiliary Circuit Equipments, Equipments in Power Circuit and their Functions, - Power Circuit Diagram of AC Locomotive, Pantograph, Circuit breaker, Tap Changer, Traction Transformer, Rectifier, Smoothing Choke Traction Motor, Equipments in Auxiliary Circuit & their Functions: Head Light, Flasher Light, Horn, Marker Light, Batteries, Arno Converter, Blowers, Exhausters Compressors, List and Purpose of Different Type of Relays, List and Purpose of Different Type of Contactors, Three Phase Locomotive, Power Circuit of Three Phase Locomotive, Power Supply Arrangement for Auxiliary, Machines in Three Phase Locomotive.</p>	10	15
03	<p>Maintenance of Locomotives Locomotive Maintenance:- Need of Maintenance and Policy of Obselence. Defects, Ideal Maintenance: Means to Improve the Reliability of Locomotive, - Means to Improve Availability of Locomotive, - Means to Reduce Maintenance Cost. - Maintenance Record, - Training Facility, Characteristics of Efficient Maintenance, Electrical Faults and Their Causes, Fault Localization. Necessity of Testing. Testing Procedure. Individual Equipment Tests.</p>	10	15
SECTION-II			
04	<p>Protection of Electric Locomotive Introduction. Broad Strategy For Protection, Surge Protection, Direct Lightening Strokes. Switching Surges: External and Internal, Overload Protection of Main Power Circuit, Earth Fault Protection of Power and Auxiliary Circuit, Protection from Over Voltage and Under Voltage, Differential Current Protection of Traction Circuits, Protection Against High and Low Air Pressure in the Compressed Air Circuit, Temperature Monitoring, Protection of Transformer By Buchholz's Relay, Monitoring of Ventilation System of Key Locomotive Equipments, Protection Against Accidental Contact with HT Equipment. Protection Against Fire, Fire Prevention Strategy.</p>	10	15
05	<p>BRAKING Introduction: 1)plugging 2) rehostatic braking 3)regenerative braking 4) limits of braking. Regenerative braking with three phase induction motors Braking with single phase induction motors Mechanical braking: 1)The vacuum brake 2)The compressed air break</p>	10	15
06	<p>Train movement & Energy consumption Introduction, typical speed-Time curves, crest speed, average speed & schedule</p>	04	10

	speed, factors affecting schedule, speed factors affecting energy consumption Train Resistance, adhesive wt., coefficient adhesion		
		Total	48 80

Assignments:

Drawing Sheets:

1. Drawing on half Imperial sheet for Traction Substation Layout or Feeding Post.
2. Survey report on present locomotive system in Mumbai.

(**Note:** Students should be able to identify, explain the functions of various components of substation and OHE.)

Visits:

Visit to Traction Substation (for substation layout and OHE) **or** Railway Station (for signaling and train lighting) and writing a report.

Learning Resources:

Text Books:-

- 1) Modern Electric Traction, 1st Edition by H Partab, Dhanpat Rai & Sons.
- 2) Electric Traction, 1st Edition by J Upadhyay, S N Mahendra, Allied Publishers Limited.
- 3) Power system engineering by A.Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar

Reference Books:-

- 1) Indian Railways, 3rd Edition by M A Rao, National Book Trust of India.
- 2) Railway Electric Traction by F W Carter, General Books Publisher.
- 3) Utilization of Electric Power and Electric Traction by Garg Gc, Khanna Publishers.
- 4) Utilization of Electric Power and Electric Traction, 1st Edition by J B Gupta, S K Kataria and Sons

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : High Voltage Engineering
Subject Code : 132EE64E2

Teaching and Examination Scheme:-

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		Practical		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	-	2	3	80	32	20	100	40	-	-	-	-	25	10	125

Rationale:-

With increase in power demand and advancement in technologies high voltage transmission has become an essential part of today's power system. This course in "High Voltage Engineering" helps to understand fundamental properties of materials used and their failure mechanism to get optimal design of a high voltage system.

Objectives:-

To provide an understanding of high voltage phenomena and to present basic of high voltage insulation testing and designing.

Syllabus

Part I:- Theory

Sr. No	Contents	L	M
Section I			
1	Electric field stress - control and estimation <ul style="list-style-type: none"> • Concept of Electric field stress, its control and estimation • Analysis of Electrical field intensity <ul style="list-style-type: none"> ▪ in Homogenous Isotropic Single dielectric and ▪ in multi dielectric system. 	5	8
2	Conduction and breakdown in air and other gaseous dielectrics in electric fields. <ul style="list-style-type: none"> • Ionization processes, Townsend's current growth equation- Primary and secondary processes. • Townsend's criterion for breakdown in electronegative gases. • Paschen's law, breakdown in non-uniform fields and corona discharges. • Post-breakdown phenomena and application. • Practical considerations in using gas for insulation purposes. 	10	16
3	Conduction and Breakdown in solid and liquid dielectrics. <ul style="list-style-type: none"> • Intrinsic, Electro-mechanical and Thermal breakdown 	9	16

	<ul style="list-style-type: none"> • Breakdown of solid dielectrics in practice • Breakdown of composite insulation. • Application of insulating materials in electrical power apparatus and electronic equipments. 		
	Section II		
4	Generation of High Voltage and Currents. <ul style="list-style-type: none"> • Generation of HVDC • Generation of HVAC and Impulse Voltage • Introduction to working of Impulse Generator 	9	16
5	Measurement of high voltage and High currents <ul style="list-style-type: none"> • Measurement of HVDC • Measurement of HVAC and impulse voltage and currents 	5	8
6	Testing and evaluation of dielectric materials and power apparatus. <ul style="list-style-type: none"> • Non-destructive testing of dielectric materials , DC resistivity measurement • Dielectric and loss factor measurement, • Partial discharge measurements. • Testing of insulators, bushing, isolators, circuit breakers, cable, transformers, high voltage motors, surge diverters. • Radio interference measurement. 	10	16
Total		48	80

Part II:- Tutorials

- 5 assignments based on the syllabus.
- Visit to High Voltage Lab (report to be made).

Learning Resources:-

Text Book:-

1. Naidu M.S. and Kamaraju V, High Voltage Engineering, TMH Publication, 2nd edition.,1995
2. Wadhwa C.L. "High Voltage Engineering" Wiley Eastern Ltd, 1st edition., 1994.
3. Kuffel E. and Abdullah M., Introduction to High Voltage Engineering, Pergamon, 1970

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Power System Analysis
Subject Code : 132EE64E3

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		Practical		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
3	2	-	3	80	32	20	100	40	-	-	-	-	25	10	125

Rationale:–

This course will cover the modeling issues and analysis method for the power flow, short circuit, and stability analysis required to be carried out for the power system.

This will make students to understand the necessity and to become familiar with the modeling of power system and components and to apply different methods to analyze power system for the purpose of system planning and operation.

Objectives:- The objective of the course is to bring together the many dimensions and discuss a number of engineering and economic aspects relating to power system operation and control. To model and analyze the power system under abnormal (or) fault conditions.

Syllabus

Part I:- Theory

Sr. No	Contents	L	M
Section I			
1	Power system Structure <ul style="list-style-type: none"> • Network and Topology 	05	08
2	Load flow <ul style="list-style-type: none"> • Need of load flow analysis • Aspects of load flow analysis • Input data required for load flow analysis • Classification of buses. • Y bus formation • Static load flow equation for simple two bus characteristics information obtained from load flow. • Constraint to be consider in load flow • Relation between P-Q and $\delta - V$. 	12	16
3	Approximate load flow(maximum three bus system problem) <ul style="list-style-type: none"> • Gauss seidel method • Newton – Raphson method • De- coupled load flow. • Fast decoupled load flow. • Comparison of all load flow studies for various advantage and 	12	16

	disadvantage		
	Section-II		
4	Voltage profile control <ul style="list-style-type: none"> • using tap changing transformer • Generator excitation 	05	10
5	Power system Stability <ul style="list-style-type: none"> • Stability Definitions • Rotor angle stability • Voltage stability. • Equal area criteria for power system stability(No differential equations) 	09	20
6	Introduction of FACT's Devices	05	10
	Total	48	80

Learning Resources:-

Text Books:

- 1) Power system analysis by Nagrath & Kothari
- 2) Power system analysis by B. R Gupta
- 3) Power system analysis by C.L. Wadhwa

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Management Principles
Subject Code : 132EE65

Teaching and Examination Scheme:–

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		OR		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
2	-	-	-	-	-	-	-	-	-	-	-	-	25	10	25

Rationale:

Students of diploma courses on completion of the course join industry in supervisory positions, where they are responsible for decision making, leading, motivating and controlling the subordinates. This subject aims at exposing them to theory and practice related to these through lectures, seminars and case studies.

Objectives:

The students will able to:

1. Familiarize environment in the world of work
2. Explain the importance of management process in Business.
3. Identify various components of management.
4. Describe Role & Responsibilities of a Technician in an Organizational Structure.
5. Apply various rules and regulations concerned with Business & Social responsibilities of the Technician.

Syllabus

Part I:- Theory

Sr. No	Contents	L
1	Management: Definition, functions, levels, skills.	2
2	Planning: Process, merits, limitations.	4
3	Decision making: Decision making models, group decision making.	4
4	Organizing: Span of management, delegation of authority, decentralization of authority, departmentation.	8
5	Communication: Upward, downward, formal and informal communication. Barriers to effective communication and ways to overcome them.	4
6	Motivation: Maslow's and Herzberg's theories. Incentives.	4
7	Leadership: Autocratic and democratic styles, Situational leadership. Leadership continuum and managerial grid.	4
8	Controlling: Controlling process. Requirements of a good control system.	2
	Total	32

Assignments:

- a) **SIX** groups and individual Assignments
- b) 3 to 4 case studies,
- c) 1 seminar and
- d) 1 role plays/group discussion on the above topics.

Learning Resources:**Text Book:**

Industrial and business management, 2007 Edition, by Telsang M.T.,
S Chand Publishers.

Reference Books:

1. Essentials for Management: An International Perspective, 8th Edition, By Koontz , Mhe
Publisher.
2. Industrial Organisation and Management, 3rd Edition by Dr P N Reddy, Prof H R
Appannaiah, Prof V Surendar, Himalaya Publishers.

Course Name : Diploma in Electrical Engineering
Course Code : DEE
Semester : Sixth
Subject Title : Project
Subject Code : 132EE66

Teaching and Examination Scheme:-

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks
L	T	P		Theory		Test	Total		Practical		OR		TW	
			Max	Min	Max		Min	Max	Min	Max	Min	Max	Min	
-	-	4	-	-	-	-	-	-	-	50	20	50	20	100

Rationale:-

Diploma holders need to be capable of doing self study throughout their life as the technology is developing with fast rate. Student will be able to find out various sources of technical information and develop self-study techniques to prepare a project and write a project report.

This subject is intended to teach students to understand facts, concepts and techniques of electrical equipments, its repairs, fault finding and testing, estimation of cost and procurement of material, fabrication and manufacturing of various items used in electrical field. This will help the students to acquire skills and attitudes so as to discharge the function of supervisor in industry and can start his own small-scale enterprise.

Objectives:-

The students will be able to:

1. Work in Groups, Plan the work, and Coordinate the work.
2. Develop leadership qualities.
3. Analyse the different types of Case Studies.
4. Develop innovative ideas.
5. Develop basic technical skills by hands on experience.
6. Write project report.
7. Develop skills to use latest technology in Electrical field.

Course Contents:

Following activities related to project are required to be dealt with, during this semester

1. Form project batches & allot project guide to each batch. (Maximum 5 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide
Topic / Problem / Work should be approved by Head of Department.
3. Each project batch should prepare action plan of project activities & submit the same to respective guide.
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report.

NOTE:

The students may select different project for Semester VI.

OR

This project may be the continuation (2nd Part) of Semester V

Learning Resources:

Books/Magazines:

1. IEEE Transactions/Journals
2. Electrical India
3. IEEMA Journal
4. Elecrama
5. Technorama
6. Urja
7. Industrial Automation
8. Electronics for You
9. Electronics Projects
10. Computer World
11. Chip
13. Computer Active
12. Any Journal Related to Electrical Engg./Electronics/Computer/Information Technology.

Course Name : Diploma in Electrical Engineering

Course Code : DEE

Semester : Sixth

Subject Title : Student Centered Activity/Test

Teaching Scheme			Paper Hours	Examination Scheme										Total Marks	
L	T	P		Theory		Test	Total		P		O		TW		
				Max	Min		Max	Min	Max	Min	Max	Min	Max		Min
-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Rationale:–

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Expert lectures, E-learning sources, E-library, Internet, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

The Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Take the advantages of E-learning sources