DIPLOMA PROGRAMME COURSE STRUCTURE [3RD YEAR ONWARD COURSES]							
Based on CBCS system & OBE model Recommended scheme of study (For Diploma in Electrical & Electronics Engineering)							
Semester Of Study (Recommended)	**Category of course**	**Course Code**	**Subjects**	**Mode of delivery & credits** *L-Lecture. T-Tutorial. P-practical*			**Total Credits** *C-Credit*
				L	**T**	**P**	**C**
THEORY							
FIFTH	**PC**	DEE 501	Control System	3	0	0	3
		DEE 503	Power System	3	0	0	3
	PE	DPE 541/542/543	PE-II	3	0	0	3
		DPE 544/545/546	PE-III	3	0	0	3
	OE	DOE 541/542/543	OE-II [Courses from other Branches]	3	0	0	3
	SESSIONAL						
	PC	DEE 506	Electrical Workshop Lab	0	0	2	1
		DEE 502	Control system Lab	0	0	2	1
	Project	DPR 541	Minor Project	0	0	2	1
	Summer Internship	DSI 541	Summer Internship-II (6 weeks) after IV Semester	0	0	0	4
PERIODS PER WEEK				**15**	**0**	**6**	
TOTAL (THEORY + LABS) CREDITS							**22**
TOTAL PERIODS PER WEEK							**21**

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAMME ELECTIVES (PE)*							
SEMESTER	**Code no.**	**Name of the PE courses**	**Prerequisite/ Corequisite courses with code**	**L**	**T**	**P**	**C**
PE-I							
SEM-IV	DPE 441	Electrical Equipment Maintenance	Electrical Machine	3	0	0	3
	DPE 442	Industrial Instrumentation And Condition Monitoring	Electrical Measurements and Instrumentation	3	0	0	3
	DPE 443	Applied Communication	Basic Electronics	3	0	0	3
PE-II							
SEM- V	DPE 541	Industrial Automation & Control.	Electrical Measurements and Instrumentation	3	0	0	3
	DPE 542	Communication Technologies	Analog & digital Electronics	3	0	0	3
	DPE 543	Principle of Electric Vehicle	Power electronics	3	0	0	3
PE-III							
SEM-V	DPE 544	Solar Power Technologies	Electrical energy generation	3	0	0	3
	DPE 545	Electric Traction	Utilization of Electric power	3	0	0	3
	DPE 546	Electrical Testing and Commissioning	Power system	3	0	0	3
PE-IV							
SEM-VI	DPE 641	Applications of IOT	Microprocessor and Microcontroller	3	0	0	3
	DPE 642	Industrial Drives	Utilization of Electric power	3	0	0	3
	DPE 633	Programmable Logic Controllers	Microprocessor and Microcontroller	3	0	0	3
PE-V [Sessional]							
SEM-VI	DPE 635	Programmable Logic Controllers Lab	Microprocessor and Microcontroller	0	0	2	1
	DPE 644	Industrial Drives Lab	Utilization of Electric power	0	0	2	1

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING OPEN ELECTIVES (OE)*							
SEMESTER	**Code No.**	**Name of the OE courses**	**Prerequisites courses with code**	**L**	**T**	**P**	**C**
OE-I							
FOURTH	DOE 441	Utilization of Electrical Energy		3	0	0	3
	DOE 442	Electrical Energy Generation System		3	0	0	3
	D0E 443	Fundamental of Power Electronics		3	0	0	3
OE- II							
FIFTH	DOE 541	Introduction to Power System		3	0	0	3
	DOE 542	Computational technique in Electrical Engineering		3	0	0	3
	DOE 543	Building Electrification and House Wiring		3	0	0	3
OE- III							
SIXTH	DOE 651	Consumer Electronics		3	0	0	3
	DOE 652	Introduction to Sustainable Energy		3	0	0	3
	DOE 653	Electromechanical Energy Conversion		3	0	0	3
***OPEN ELECTIVES TO BE OPTED ONLY BY OTHER DEPARTMENT STUDENTS**							

POWER SYSTEM

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DEE 503**			COURSE TITLE**: POWER SYSTEM**				
COMPULSORY / OPTIONAL: **COMPULSORY**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to:

1.	To understand the basic structure and components of a power system.
2.	To study line insulators and their role in transmission systems..
3.	To analyze the performance of transmission lines under different conditions.
4.	To understand the construction and working of underground cables
5.	To introduce students to substations and their role in power distribution.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Explain the structure and working of a power system.
CO 2.	Identify different types of line insulators and their applications.
CO 3.	Analyze the performance of transmission lines under various operating conditions.
CO 4.	Understand the construction, working, and fault detection in underground cables.
CO 5.	Describe different types of substations and their key components.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : BASICS OF TRANSMISSION AND DISTRIBUTION** 1.1 Single line diagrams with components of the electric supply. 1.2 Classification of transmission lines. 1.3 Characteristics of high voltage for power transmission. 1.4 Method of construction of electric supply transmission system ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : TRANSMISSION LINE PARAMETERS AND PERFORMANCE** 2.1 Transmission voltage levels and choice of transmission voltage 2.2 Types of transmission lines: Overhead and Underground 2.3 Transmission line parameters: Resistance, Inductance, and Capacitance 2.4 Types of insulators and their applications 2.5 String efficiency and methods to improve it ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : PERFORMANCE OF TRANSMISSION LINES** 3.1 Classification: Short, Medium, and Long transmission lines 3.2 Line performance parameters: Efficiency and Regulation 3.3 Ferranti effect, Skin effect, and Proximity effect 3.4 Surge impedance loading and Corona effect 3.5 Transmission losses and methods of loss reduction ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : A.C DISTRIBUTION SYSTEM** 4.1 Primary and secondary distribution systems 4.2 AC distribution systems and their comparison 4.3 Types of underground cables and their construction 4.4 Insulation resistance and capacitance of cables 4.5 Fault detection in underground cables ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : EXTRA HIGH VOLTAGE TRANSMISSION** 5.1 Introduction to Extra High Voltage AC (EHVAC) transmission line 5.2 High Voltage DC (HVDC) Transmission Line 5.3 limitations and applications of EHV 5.4 Features of EHVAC and HVDC transmission line. ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Principles of Power System	Mehta, V.K, S. Chand and Co. New Delhi	9788121924962
2.	A Course in Electrical Power	Soni;Gupta; Bhatnagar Dhanpat Rai and Sons New Delhi	9788177000207

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	A Course in Power Systems	Gupta,J.B. S.K. Kataria and sons, New Delhi,	9788188458523
4.	Electrical Power System	Ned Mohan, Wiley India Pvt. Ltd. New Delhi,	9788126541959

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	2	2	1	2
3	3	3	3	3	3	2	3	2	1	2
4	3	2	2	3	3	2	2	2	1	2
5	3	2	2	2	3	3	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

CONTROL SYSTEM

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DEE 501**			COURSE TITLE**: CONTROL SYSTEM**				
COMPULSORY / OPTIONAL: **COMPULSORY**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:
This course envisions imparting to students to:

1.	State basic concepts of control systems and various methods to represent a system
2.	Illustrate and interpret a system using time domain techniques.
3.	Illustrate and interpret a system using frequency domain techniques.
4.	Classify different types of systems, solve different control problems and construct root locus, Bode plot and Nyquist plots for different systems
5.	Summarize and design controllers for systems.

Course Outcomes:
After the completion of this course, students will be able to:

CO 1.	Understand the fundamentals of control systems, including open-loop and closed-loop systems, Laplace transform applications, and mathematical modeling of physical systems.
CO 2.	Analyze and determine the transfer function of electrical systems using block diagrams, reduction techniques, signal flow graphs, and Mason's gain formula.
CO 3.	Evaluate time response characteristics of control systems, assess steady-state errors, and analyze first and second-order systems, including the basics of PID controllers.
CO 4.	Examine system stability using Routh's criterion, root locus, Bode plots, Nyquist plots, and polar plots in the frequency domain.
CO 5.	Examine system stability using Routh's criterion, root locus, Bode plots, Nyquist plots, and polar plots in the frequency domain.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : Basics of Control Systems** 1.1 Introduction to control system 1.2 Introduction to laplace transform 1.3 Open loop and closed loop system 1.4 Mathematical Modeling of Physical system. ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : Introduction to Transfer Function** 2.1 Transfer function Block Diagram representation 2.2 Transfer function of Electrical system 2.3 Block Diagram representation and reduction techniques 2.4 SFG 2.5 Mason's gain formula ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : Time Response Analysis** 3.1 Standard test signals 3.2 Steady state analysis 3.3 Effect of input on steady state error 3.4 Analysis of Ist and IInd order system 3.5 Introduction to PID Controllers ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : Stability & freq Domain Analysis** 4.1 Concept of stability 4.2 Routh stability criterion. 4.3 Basic concepts of Root locus. 4.4 Introduction to Bode plot. 4.5 Stability determination from Polar plot 4.6 Nyquist plot analysis ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : Control System Component** 5.1 Potentiometer as a error detector 5.2 Servomotor 5.3 Stepper motor 5.4 Synchros ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Control systems Engineering	I.J Nagrath , M.Gopal	9788122426090
2	Control Systems	A.Anand Kumar	9788120349391

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Modern Control System Theory- M. Gopal	M. Gopal.	9780470221570
2.	Modern Control Engineering	K. Ogata	9780136156734
3.	Control Systems	N. K. Sinha	9780470235614

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	2	3	2	1	1	1	1	1	2	3
2	3	3	3	2	2	2	2	2	1	2
3	3	3	2	2	2	3	3	2	1	2
4	3	2	2	2	3	3	3	2	1	2
5	2	3	3	2	2	2	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

INDUSTRIAL AUTOMATION & CONTROL

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 541**			COURSE TITLE**: INDUSTRIAL AUTOMATION & CONTROL**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to

1.	To introduce the fundamentals of industrial automation and control systems.
2.	To understand the working of Programmable Logic Controllers (PLC) and their applications.
3.	To study different types of sensors, actuators, and control elements used in industrial automation.
4.	To learn about Supervisory Control and Data Acquisition (SCADA) and Distributed Control Systems (DCS).
5.	To analyze industrial automation applications in real-world manufacturing and process industries.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Understand the fundamentals of industrial automation and different types of control strategies.
CO 2.	Explain the working principles of sensors, transducers, and actuators used in automation systems.
CO 3.	Analyze and design Programmable Logic Controller (PLC)-based automation solutions.
CO 4.	Understand Supervisory Control and Data Acquisition (SCADA) systems and Human-Machine Interfaces (HMI) for process control.
CO 5.	Apply industrial networking and communication protocols, including IoT-based automation solutions.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : INTRODUCTION TO INDUSTRIAL AUTOMATION** 1.1 Fundamentals of Industrial Automation 1.2 Need & Advantages of Automation in Industries 1.3 Types of Automation: Fixed, Programmable, and Flexible 1.4 Control Strategies: Open-loop & Closed-loop Control Systems 1.5 Role of Microcontrollers and PLCs in Industrial Automation ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : SENSORS, TRANSDUCERS, AND ACTUATORS** 2.1 Introduction to Sensors and Transducers 2.2 Types of Sensors: Proximity, Temperature, Pressure, Level, and Flow Sensors 2.3 Actuators: Types and Applications (Hydraulic, Pneumatic, Electrical) 2.4 Signal Conditioning and Data Acquisition Systems 2.5 Industrial Sensor Applications and Selection Criteria ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : Programmable Logic Controllers (PLC) and Applications** 3.1 Introduction to PLCs – Architecture and Operation 3.2 PLC Programming: Ladder Logic, Functional Block Diagram (FBD), Instruction List (IL) 3.3 Timers, Counters, and Data Handling in PLCs 3.4 Interfacing PLC with Sensors and Actuators 3.5 Practical Applications of PLC in Industrial Automation ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : SCADA and HMI in Industrial Control** 4.1 Introduction to SCADA Systems – Functions and Architecture 4.2 Components of SCADA: RTU, MTU, Communication System 4.3 SCADA Communication Protocols: MODBUS, PROFIBUS, Ethernet/IP 4.4 Human-Machine Interface (HMI) – Working and Implementation 4.5 SCADA Applications in Industrial Process Control ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : Industrial Communication and IoT-Based Automation** 5.1 Industrial Networking: Fieldbus, PROFIBUS, CAN, Ethernet 5.2 Wireless Communication in Industrial Automation 5.3 Introduction to IIoT (Industrial Internet of Things) 5.4 Smart Sensors and Cloud-Based Automation 5.5 Case Studies on Industry 4.0 and Smart Factories ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Introduction to Programmable Logic Controllers	Dunning, G, Thomson /Delmar learning, New Delhi, 2005,	13 : 9781401884260
2.	Programmable Logic Controller	Jadhav, V. R, Khanna publishers, New Delhi, 2017	9788174092281

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Programmable Logic Controllers,	Petruzella, F.D, McGraw Hill India, New Delhi, 2010	9780071067386
4.	Programmable Logic Controllers	Hackworth, John; Hackworth, Federic, PHI Learning, New Del hi, 2003	9780130607188
5.	Supervisory Control and Data Acquisition	Boyar, S. A, ISA Publication, USA	978 1936007097

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	2	2	1	2
3	3	3	3	3	3	2	3	2	1	2
4	3	2	2	3	3	2	2	2	1	2
5	3	2	2	2	3	3	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

COMMUNICATION TECHNOLOGIES

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 542**			COURSE TITLE**: Communication Technologies**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to attain:

1.	To understand the fundamentals of communication systems and their significance.
2.	To study different types of analog and digital communication techniques.
3.	To introduce wireless and mobile communication technologies.
4.	To explore optical fiber communication and its applications.
5.	To understand modern communication technologies such as IoT, 5G, and satellite communication.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Explain the basic principles of communication systems and their importance.
CO 2.	Analyze analog and digital communication techniques.
CO 3.	Describe wireless and mobile communication technologies.
CO 4.	Understand the principles and applications of optical fiber communication.
CO 5.	Discuss modern communication technologies such as IoT, 5G, and satellite communication.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : DATA COMMUNICATION AND MODULATION** 1.1 Block diagram of communication system 1.2 Types of communication system 1.3 Classification of communication technique 1.4 Modulation and demodulation 1.5 Pulse Modulation 1.6 Advantages of pulse modulation over AM and FM. ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : DIGITAL MODULATION TECHNIQUES** 2.1 Digital Communication 2.2 Sampling process Nyquist sampling theorem 2.3 PCM : Block diagram, working principle, waveforms, advantages, disadvantages, application of PCM. 2.4 Principle of ASK, PSK, FSK. Application of ASK, PSK, FSK ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : DATA COMMUNICATION MEDIA** 3.1 Types of errors in data communication 3.2 Error correction techniques. 3.3 Types of communication media 3.4 Frequency band of operation 3.5 Guided media: Types of cable-twisted pair cable, co-axial cable, fiber optic cable 3.6 Unguided media: Microwave communication, Infrared communication. ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : FIBRE OPTICS** 4.1 Introduction to Fiber optic communication. 4.2 Strength and limitations of fiber optic system 4.3 Light propagation : reflection, refraction, Snell's law 4.4 Light propagation through cable: Mode of propagation, index profile 4.5 Fibre optic cables: construction, modes, & step index fibre, ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : DATA COMMUNICATION PROTOCOLS** 5.1 Open Systems Interconnection & Reference model 5.2 Introduction to protocol, FTP, SMTP, TCP/IP, UDP 5.3 Introduction to IEEE Standards for LAN and GPIB 5.4 RS-232 standard: Introduction, and working principle 5.5 Network topologies, introduction star, ring, tree, bus, mesh, hybrid

	Course Outcome: CO5	*Teaching Hours: 8 hrs*	*Marks: 20 (PE+FINAL)*

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electronic Communication System	Wayne Tomasi, Prentice Hall of India	13:9780130494924
2.	Practical Industrial Data Communications	Reynders D., Steve Macky, Wright Edvin, Newnes publication	10:07506639523

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Electronic Communication System	George F. Kennedy, Barnard Davis, Tata McGraw Hill,	13:9780074636824
4.	Principles of Digital communication systems and computer networks	Prasad K.V.K.K, Dream tech press, New Delhi,	13:9788177223620
5.	Text Book of Communication Engineering	Kumar A. Umesh Publication,	13:978818114160

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	3	2	1	2
3	3	2	2	3	3	2	3	2	1	2
4	3	3	3	2	2	2	3	2	1	2
5	3	2	2	3	2	2	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

PRINCIPLE OF ELECTRIC VEHICLE

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 543**			COURSE TITLE**:** Principle Of Electric Vehicle				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to attain the following industry identified competency through various teaching learning experiences: Maintain electric vehicles

1.	To introduce the fundamentals of electric vehicles (EVs) and their significance in sustainable transportation.
2.	To study different types of electric vehicles and their configurations.
3.	To understand the working of electric motors, power electronics, and battery management systems used in EVs.
4.	To explore charging technologies, infrastructure, and energy storage in EVs.
5.	To analyze the environmental and economic impacts of EV technology.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Explain the fundamentals of electric vehicles and their importance in sustainable transportation.
CO 2.	Describe the architecture and working of EV powertrains and their key components.
CO 3.	Understand battery technologies, their characteristics, and management in EVs.
CO 4.	Analyze different EV charging technologies and infrastructure.
CO 5.	Evaluate the environmental and economic impact of EV adoption.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : INTRODUCTION TO HYBRID AND ELECTRIC VEHICLES** 1.1 Evolution of Electric vehicles 1.2 Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV), Hybrid Electric drive (HEV), Plug in Electric vehicle (PIEV), 1.3 Components used Hybrid Electric Vehicle 1.4 Economic and environmental impacts of Electric hybrid vehicle 1.5 Comparative study of vehicles for economic, environmental aspects ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : DYNAMICS OF HYBRID AND ELECTRIC VEHICLES** 2.1 Description of vehicle movement 2.2 Factors affecting vehicle motion- Vehicle resistance, tyre ground adhesion, rolling resistance, aerodynamic drag, equation of grading resistance, dynamic equation 2.3 Drive train configuration, Automobile power train, classification of vehicle power plant 2.4 Performance characteristics of IC engine, electric motor, need of gear box 2.5 Classification of motors used in Electric vehicles ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : DC-DC CONVERTERS FOR EV AND HEV APPLICATIONS** 3.1 EV and HEV configuration based on power converters 3.2 Classification of converters –unidirectional and bidirectional 3.3 Principle of step down operation 3.4 Boost and Buck- Boost converters 3.5 Principle of Step-Up operation 3.6 Two quadrant converters; multi quadrant converters ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : DC-AC INVERTER & MOTORS FOR EV AND HEVs** 4.1 DC-AC Converters 4.2 Principle of operation of half bridge DC-AC inverter (R load, R-L load) 4.3 Single phase Bridge DC-AC inverter with R load, R-L load 4.4 Electric Machines used in EVs and HEVs, principle of operation, working & control 4.5 Characteristics and applications of above motors ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : BATTERIES FOR HYBRID AND ELECTRIC VEHICLES** 5.1 Overview of batteries 5.2 Battery Parameters, types of batteries 5.3 Battery Charging, alternative novel energy sources-solar photovoltaic cells, fuel cells, super capacitors, flywheels 5.4 Control system for EVs and HEVs, overview, Electronic control unit ECU 5.5 Schematics of hybrid drive train, control architecture ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electric & Hybrid Vehicles	A.K. Babu, Khanna Publishing House, New Delhi (Ed. 2018)	
2.	Hybrid Vehicles and the Future of Personal Transportation	Fuhs, A. E, CRC Press	

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Electric and Hybrid Vehicles: Power Sources, Models, Sustainability, Infrastruc ture And The Market	Gianfranco, Pistoia Consultant, Rome, Italy,	
4.	Electric motor drives: modelling, analysis, and control	Krishnan, R, Prentice Hall	

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	2	2	1	2
3	3	3	3	3	3	2	3	2	1	2
4	3	2	3	2	3	2	2	2	1	2
5	3	2	2	2	3	3	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

SOLAR POWER TECHNOLOGIES

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 544**			COURSE TITLE**: SOLAR POWER TECHNOLOGIES**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to attain the following industry identified competency through various teaching learning experiences: Maintain the efficient operation of various types of solar power technologies

1.	To introduce the fundamental principles of solar energy and its importance.
2.	To understand the design and working of photovoltaic (PV) systems.
3.	To study different types of solar energy conversion technologies.
4.	To explore the integration of solar power into electrical grids and storage systems.
5.	To analyze economic, environmental, and policy aspects of solar energy adoption.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Explain the fundamentals of solar energy and its characteristics.
CO 2.	Describe the working, types, and design of photovoltaic systems.
CO 3.	Understand solar thermal energy technologies and their applications.
CO 4.	Analyze energy storage and grid integration of solar power.
CO 5.	Evaluate the economic, environmental, and policy aspects of solar energy adoption.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : SOLAR ENERGY** 1.1 Solar Map of India: Global solar power radiation 1.2 Different types of Solar water heaters: Construction, working, specifications and installation 1.3 Solar Heating systems 1.4 Solar drying and different types of Solar cookers 1.5 Solar lighting ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : CONCENTRATED SOLAR POWER (CSP)** 2.1 Concentrated Solar Power (CSP) plants or solar thermal electric systems 2.2 Parabolic Trough: Construction, working and specifications 2.3 Parabolic Dish: Construction, working and specifications 2.4 Power Tower, Fresnel Reflectors: Construction, working and specifications 2.5 Solar Sterling engines ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : SOLAR PV SYSTEMS** 3.1 Solar PV cell: Types construction, working, Typical specifications of solar cells 3.2 Solar PV working principle: Series and parallel connections of solar modules 3.3 Solar Photovoltaic (PV) system: components layout and working. 3.4 Solar modules, arrays and their standard specifications 3.5 Roof top and streetlight solar PV systems and typical specifications ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : SOLAR PV ELECTRONICS** 4.1 Solar Charge controllers: working and specifications, switchgear and cables 4.2 Batteries: Different types for solar PV systems, maintenance and specifications 4.3 Solar Inverters: working and specifications 4.4 Signal conditioning systems: working and specifications 4.5 Solar Power tracking: construction, working, tilt angle, solar radiation, I-V, P-V characteristics, maximum power point tracking (MPPT) ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : SOLAR PV OFF-GRID AND GRID TIED SYSTEMS** 5.1 Solar off grid systems: layout and specifications 5.2 Solar Grid tied (on grid) systems: Working principle of grid-tied dc-ac inverter, grid synchronization and active power export 5.3 Net metering: main features and working 5.4 Solar-wind Hybrid systems: Layout and specifications.

	Course Outcome: CO5	*Teaching Hours: 8 hrs*	*Marks: 20 (PE+FINAL)*

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Solar Photovoltaics: Fundamentals, Technologies and Applications	Solanki, Chetan Singh, PHI Learning, New Delhi	9788120351110
2.	Solar Photovoltaic Technology and Systems - A Manual For Technicians	Solanki, Chetan Singh, PHI Learning, New Delhi	9788120347113

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Renewable Energy Sources and Emerging Technologies	Kothari, D.P. PHI Learning, New Delhi	
4.	Renewable Energy Systems	David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, Pearson Education New Delhi	9789332586826

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	2	2	1	2
3	3	3	3	3	3	2	3	2	1	2
4	3	2	2	3	3	2	2	2	1	2
5	3	2	2	2	3	3	2	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

ELECTRIC TRACTION

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 545**			COURSE TITLE**: ELECTRIC TRACTION**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to:

1.	To introduce the fundamental principles of electric traction and its advantages over conventional traction systems.
2.	To study different types of traction systems and their power supply arrangements.
3.	To understand the working of traction motors and their control techniques.
4.	To explore braking systems and energy-efficient operation of electric traction
5.	To analyze modern developments in high-speed rail and metro rail systems.

Course Outcomes:

After the completion of this course, students will be able to attain the following industry identified competency through various teaching learning experiences: Maintain electric traction systems

CO 1.	Explain the fundamentals and advantages of electric traction.
CO 2.	Describe the characteristics and control of traction motors.
CO 3.	Understand traction power supply systems and their components.
CO 4.	Analyze different braking systems used in electric traction.
CO 5.	Evaluate modern developments and energy-efficient techniques in electric traction.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : INTRODUCTION OF TRACTION** 1.1 Description of Electrical Traction system in India. 1.2 Advantages and Disadvantages of Electric Drive, Diesel Electric Drive, Battery Drive 1.3 Problems associated with AC traction System and remedies for it. 1.4 Voltage balance, current balance, production of harmonics, induction effects. 1.5 Metro rail system, features ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : POWER SUPPLY ARRANGEMENTS** 2.1 Constituents of supply system 2.2 Major equipment at substation 2.3 Miscellaneous equipment at control post or Switching station 2.4 Protection system for traction transformer and 25 kV centenary construction ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : OVERHEAD EQUIPMENT** 3.1 Different types of overhead equipments 3.2 Pentagonal OHE Centenary Construction 3.3 Different Types of Centenary according to speed Limit 3.4 OHE Supporting Structure, Cantilever assembly diagram 3.5 Overhead system- Trolley collector, Bow collector, Pantograph Collector ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : ELECTRIC LOCOMOTIVE** 4.1 Classification and Nomenclature of Electric Locomotive 4.2 Block diagram of AC locomotive 4.3 Power Circuit of AC Locomotive 4.4 Equipment (List and Function only) used in auxiliary circuit of AC Locomotive 4.5 Loco bogie classification according to wheel arrangements ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : TRACTION MOTORS AND TRAIN LIGHTING** 5.1 Desirable characteristics of traction motor. 5.2 Types of motors used for traction with their characteristics and features 5.3 Control of motors used for traction and methods to control 5.4 Requirements of braking, types of braking 5.5 Electric braking, Regenerative braking ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Utilization of Electric Power & Electric Traction	G.C. Garg, Khanna Book Publishing Co., New Delhi	978-93-86173-355
2	Utilization of Electric power and traction	Gupta J.B., S.K.Kataria and Son	

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3	Art and Science of Utilization of Electrical Energy	Partab H., Dhanpat Rai and Co	
4	Utilisation of electrical energy.	Open Shaw Taylor, Orient Longman ltd	

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	1	1	2	3	3	1	2	3
2	3	3	2	2	2	1	2	1	2	2
3	3	3	3	3	3	2	3	1	2	2
4	3	2	2	3	3	2	2	2	3	3
5	3	2	2	2	3	3	3	2	3	3

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

ELECTRICAL TESTING & COMMISSIONING

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DPE 546**			COURSE TITLE**: ELECTRICAL TESTING & COMMISSIONING**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:
This course envisions imparting to students to:

1.	To introduce the fundamental concepts of electrical equipment testing and commissioning.
2.	To provide knowledge of testing procedures for electrical machines, transformers, and switchgear.
3.	To study the testing of power cables, protective relays, and circuit breakers.
4.	To understand commissioning procedures and safety protocols in electrical installations.
5.	To explore modern trends and condition monitoring techniques in electrical systems.

Course Outcomes:
After the completion of this course, students will be able to:

CO 1.	Explain the importance of electrical testing and commissioning procedures.
CO 2.	Perform testing of transformers and analyze test results.
CO 3.	Conduct various tests on electrical machines and interpret performance characteristics.
CO 4.	Test power system components such as circuit breakers, relays, and cables.
CO 5.	Apply modern testing techniques and ensure safety in electrical testing.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : ELECTRICAL SAFETY AND INSULATION** 1.1Introduction to electric safeties. 1.2Factors affecting life of insulating materials 1.3classifications of insulating materials 1.4Measuring insulation resistance by different methods 1.5Insulating oil ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : INSTALLATION AND ERECTION** 2.1 Concept of foundation for installation of machinery 2.2 Concept of leveling and aligning 2.3 Installation of transformer 2.4 Requirements of installation of rotating electrical machines 2.5 Devices and tools required for installation and erection. ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : TESTING AND COMMISSIONING** 3.1 Concept of testing, Objectives, & Types 3.2 Methods of testing 3.3 Commissioning, Tests before Commissioning for transformer, induction motor, synchronous machines 3.4 Testing of transformer, 1-ph & 3-ph Induction motor 3.5 Testing of D.C. machines ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : TROUBLESHOOTING PLANS** 4.1 Internal and external causes for failure 4.2 Electrical & mechanical faults 4.3 Tools & equipment foe troubleshooting 4.4 Preparation of trouble shooting charts. ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : MAINTENANCE** 5.1 Concept of maintenance 5.2 Types of maintenance 5.3 Factors affecting maintenance 5.4 Maintenance schedules ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Design and Testing of Electrical Machines	Deshpande.M. V, PHI Learning Pvt. Ltd., 2010	9788120336452
2.	Operation and Maintenance of Electrical Equipment Vol-I	Rao, B V S Asia Club House, First Reprint, 2011	8185099022

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Maintenance and Repairs	Rosenberg. Mc GRAW-HILL, 1st Edition, May 2003	9780071396035
4.	Preventive Maintenance of Electrical Apparatus	Sharotri, S.K. Glencoe/ Mcgraw- Hill; 2ndEdition , June 1969	13: 978-0070308398

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	3	2	1	1	3	1	1	2	3
2	3	3	2	2	2	3	1	2	1	2
3	3	3	3	3	2	2	1	2	1	2
4	3	2	1	2	2	2	1	2	1	2
5	3	3	2	2	3	1	1	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

INTRODUCTION TO POWER SYSTEM

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DOE 541**			COURSE TITLE**:** Introduction to Power System				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to attain the following industry identified competency through various teaching learning experiences: Maintain the proper functioning of the electrical transmission and distribution systems.

1.	To provide fundamental knowledge about power generation, transmission, and distribution.
2.	To understand different components of power systems and their working principles.
3.	To study the performance of transmission lines and their effects.
4.	To explore different protection methods and safety aspects in power systems
5.	To analyze modern trends and renewable integration in power systems.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Understand the basic structure and components of power systems.
CO 2.	Explain different types of transmission systems and their components.
CO 3.	Analyze the performance of transmission lines under different operating conditions.
CO 4.	Describe the working and testing of distribution systems and underground cables.
CO 5.	Understand the role of substations, protection methods, and modern trends in power systems.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : Introduction** 1.1 Structure of a power system. 1.2 Load factor, diversity factor, plant capacity factor, plant utilization factor. 1.3 Load Duration Curve & Mass Curve 1.4 Comparison of DC and AC transmission Line 1.5 Advantages of High Transmission Line. ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : Line Insulators:** 2.6 Main Components of Overhead Lines. 2.7 Line Supports. 2.8 Insulators & Types of Insulators. 2.9 String Efficiency & Methods of Improving String Efficiency. 2.10 Corona, Factors Affecting Corona, Advantages and Disadvantages of Corona. ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : Performance of Transmission Lines:** 3.1 Sag in Overhead Lines & Calculation of Sag 3.2 Classification of Overhead Transmission lines 3.3 1-Ph & 3-Ph Short Transmission Lines 3.4 Effect of Load p.f. on Regulation and Efficiency. 3.5 Medium Transmission Lines ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : Underground Cables:** 4.1 Types & Construction of Cables. 4.2 Insulating Materials for Cables 4.3 Laying of Underground Cables 4.4 Cables for 3-Phase Service 4.5 Insulation Resistance of a Single-Core Cable ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : Sub -Stations:** 5.1 Introduction 5.2 Classification of Sub-Stations 5.3 Comparison between Outdoor and Indoor Sub-Stations 5.4 Key Diagram of 66/11 kV Sub-Station ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Utilization of Electric Power & Electric Traction	G.C. Garg, Khanna Book Publishing Co., New Delhi	978-93-86173-355
2.	Principles of Power System	Mehta, V.K, S. Chand and Co. New Delhi	9788121924962

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	A Course in Electrical Power	Soni;Gupta; Bhatnagar, Dhanpat Rai and Sons New Delhi	9788177000207
4.	A Course in Power Systems	Gupta,J.B. S.K. Kataria and sons, New Delhi	9788188458523

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	3	2	1	3	3	2	1	2	3
2	3	3	2	2	3	2	3	2	1	2
3	3	3	3	3	3	3	2	2	1	2
4	3	2	1	2	3	2	3	2	1	2
5	3	3	2	2	3	3	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

COMPUTATIONAL TECHNIQUE IN ELECTRICAL ENGINEERING

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DOE 542**			COURSE TITLE**:** COMPUTATIONAL TECHNIQUE IN ELECTRICAL ENGINEERING				
COMPULSORY / OPTIONAL: **OPTIONAL** (Basic Mathematics, Electrical Circuit Analysis)							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to:

1.	To introduce fundamental numerical and computational techniques used in electrical engineering.
2.	To provide knowledge of solving electrical circuit problems using numerical methods.
3.	To familiarize students with optimization techniques in electrical engineering.
4.	To develop problem-solving skills using MATLAB and other computational tools.
5.	To explore applications of computational techniques in power systems, control systems, and signal processing.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Understand fundamental computational techniques and their role in electrical engineering.
CO 2.	Apply numerical methods for solving circuit analysis problems.
CO 3.	Use optimization techniques for efficient electrical engineering solutions.
CO 4.	Analyze control systems and signal processing applications using computational tools.
CO 5.	Explore modern computational tools for electrical engineering applications.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : INTRODUCTION TO COMPUTATIONAL METHODS**: 1.1 Overview of computational techniques. 1.2 computational techniques and their applications in electrical engineering 1.3 Error analysis of computational techniques. 1.4 numerical precision computational techniques. ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : NUMERICAL METHODS**: 2.1 Root-finding algorithms (e.g., Newton-Raphson method). 2.2 Numerical differentiation and integration. 2.3 Solving ordinary differential equations using methods like Runge-Kutta. ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : LINEAR ALGEBRA APPLICATIONS**: 3.1 Solving systems of linear equations. 3.2 Eigen value and eigenvector analysis. 3.3 Matrix operations and decompositions. ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : OPTIMIZATION TECHNIQUES**: 4.1 Linear and nonlinear optimization methods. 4.2 Least squares fitting and curve fitting. 4.3 Introduction to algorithms like simulated annealing and genetic algorithms. ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : COMPUTATIONAL TOOLS AND SIMULATION**: 5.1 Utilizing software tools (e.g., MATLAB, Simulink) for modeling and simulation. 5.2 Implementing algorithms for signal processing and control systems. 5.3 Visualization of computational results. ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Numerical Methods for Engineers	Steven C. Chapra, Raymond P. Canale	
2.	Applied Numerical Methods with MATLAB for Engineers and Scientists	Steven C. Chapra	

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Numerical Methods in Engineering & Science	B.S. Grewal	
4.	Introduction to Linear Algebra	Gilbert Strang	
5.	Engineering Optimization: Theory and Practice	Singiresu S. Rao	

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	3	2	2	2	1	0	1	2	3
2	3	3	2	3	3	1	0	2	1	2
3	3	3	3	3	3	1	0	2	1	2
4	3	3	3	3	3	2	1	2	1	2
5	3	3	3	3	3	2	1	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

BUILDING ELECTRIFICATION & HOUSE WIRING

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DOE 543**			COURSE TITLE**: BUILDING ELECTRIFICATION & HOUSE WIRING**				
COMPULSORY / OPTIONAL: **OPTIONAL**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
3	0	0	3	3	50	50	100

RATIONALE:

This course envisions imparting to students to attain the following industry identified competency through various teaching learning experiences: Design electrical installation systems in building complexes.

1.	To impart knowledge of house wiring, electrical safety, and building electrification standards.
2.	To develop skills in designing and implementing domestic and commercial electrical wiring.
3.	To familiarize students with wiring accessories, circuit protection devices, and earthing systems.
4.	To enable students to interpret electrical layouts and apply relevant codes and standards.

Course Outcomes:

After the completion of this course, students will be able to:

CO 1.	Select accessories, wires, cables and wiring systems for electrification.
CO 2.	Design electrical wiring installation system for residential unit.
CO 3.	Design proper illumination scheme for residential unit.
CO 4.	Prepare wiring layouts on wiring board.
CO 5.	Locate and diagnose faults in electrical wiring installation.

COURSE CONTENT DETAILS:

MODULE	TOPICS/SUBTOPICS
1	**TITLE : WIRING TOOLS AND ACCESSORIES** 1.1 Tools and equipments required for wiring 1.2 Classification of electrical accessories 1.3 symbols of electrical accessories 1.4 Switch, Holders, Socket outlets and plugs ***Course Outcome: CO1 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
2	**TITLE : ELECTRICAL WIRES AND UNDERGROUND CABLES** 2.1 Conductors 2.2 flexible cable 2.3 Wire jointing methods. 2.4 Classification of cables 2.5 Cable laying methods ***Course Outcome: CO2 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
3	**TITLE : WIRING METHODS AND WIRING LAYOUT** 3.1 Classification of wiring methods 3.2 Conduit wiring 3.3 Comparison of various wiring systems. 3.4 General BIS rules for domestic installations. 3.5 Drawing of electrical wiring circuits ***Course Outcome: CO3 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
4	**TITLE : RESIDENTIAL BUILDING ELECTRIFICATION** 4.1 Domestic Dwellings/Residential Buildings 4.2 Electrical installation for residential building 4.3 Difference between residential and industrial load 4.4 Lighting and power circuits 4.5 Design and drawing, estimation and costing ***Course Outcome: CO4 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***
5	**TITLE : PROTECTION OF ELECTRICAL INSTALLATION** 5.1 Introduction to protection devices 5.2 Fuse & Types of fuses 5.3 circuit Breaker & its types 5.4 Earthing and its requirements ***Course Outcome: CO5 Teaching Hours: 8 hrs Marks: 20 (PE+FINAL)***

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electrical Design Estimating and Costing	Raina, K.B. and S.K.Bhattacharya, New Age Interna tional Ltd., New Delhi	13: 978-81-224-0363-3
2.	Electrical Estimating and Costing	Allagappan,N. S.Ekambarram, New Delhi	13: 9780074624784

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
3.	Electrical Estimating and Costing	Singh, Surjit, Dhanpat Rai and Co. New Delhi	1234567150995
4.	A Course in Electrical Installation Estimating and Costing	Gupta, J B, S K Kataria and Sons,New Delhi	978-93-5014-279-0

E- Reference

1.	http://nptel.ac.in/courses/108108076/1

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	3	2	2	1	1	2	1	1	2	3
2	3	3	2	2	2	3	3	2	1	2
3	3	3	3	2	3	3	2	1	2	3
4	3	3	3	3	3	3	3	2	1	2
5	3	3	3	2	3	3	3	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

ELECTRICAL WORKSHOP LAB.

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DEE 506**			COURSE TITLE: **ELECTRICAL WORKSHOP LAB**				
COMPULSORY / OPTIONAL: **COMPULSORY**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	50	50	100

Course Objectives

This course envisions imparting to students to:

1.	To provide hands-on experience in electrical wiring, electrical machine operations, and safety procedures.
2.	To develop practical skills in the installation, testing, and troubleshooting of electrical systems.
3.	To familiarize students with electrical measuring instruments, switchgear, and protective devices.
4.	To ensure understanding of electrical safety regulations and standards.

Course Outcomes

After the completion of this course, students will be able to:

CO 1	Demonstrate knowledge of electrical safety practices and use of electrical tools.
CO 2	Perform different types of electrical wiring and understand installation procedures.
CO 3	Identify, connect, and test electrical machines and transformers.
CO 4	Measure electrical parameters using various measuring instruments.
CO 5	Understand switchgear, protective devices, and fault diagnosis techniques.

List of Experiments (The experiment list may vary to accommodate recent development in the field)

1. Study and demonstration of electrical safety rules, first aid for electric shocks, and use of personal protective equipment (PPE).
2. Identification and use of electrical tools (pliers, screwdrivers, multimeters, meggers, wire strippers, etc.).
3. Study of electrical symbols, circuit diagrams, and standard wiring codes.
4. Wiring of a simple lamp control circuit using a switch, socket, and fuse.
5. House wiring for Series and Parallel circuits.
6. Wiring of a staircase circuit using two-way switches.
7. Wiring of a go down lighting system.
8. Wiring of a fan regulator with an indicator lamp.
9. Study and installation of MCB, ELCB, RCCB, and fuses.
10. Earthing connection: Plate earthing and Pipe earthing, with resistance measurement.
11. Identification and wiring of single-phase transformers, connection, and testing.
12. Open circuit (OC) and short circuit (SC) tests on a transformer.
13. Identification and testing of DC motors and their wiring connections.
14. Wiring and testing of a single-phase induction motor with a capacitor start.
15. Star-Delta starter wiring for three-phase induction motors.

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1	Electrical Workshop: Safety, Commissioning, Maintenance & Testing of Electrical Equipment	R.P. Singh	
2	Laboratory Manual for Electrical Workshop	S.K. Bhattachary	

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Electrical Wiring, Estimating and Costing	S.L. Uppal & G.C. Garg	
2.	A Course in Electrical Installation Estimating and Costing	J.B. Gupta	

E- Reference

Mapping of Course Outcomes onto Program Outcomes

Course Outcome #	Program Outcomes							PSO		
	1	2	3	4	5	6	7	1	2	3
1	2	3	2	1	1	1	1	1	2	3
2	2	3	2	2	1	1	1	2	1	2
3	2	3	3	3	1	1	1	2	1	2
4	2	2	1	2	1	1	1	2	1	2
5	2	3	2	2	1	1	1	2	1	2

EXPERT CONSULTATION COMMITTEE (ACADEMICS / INDUSTRIES)

CONTROL SYSTEM LAB.

PROGRAMME: DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING							
COURSE CODE: **DEE 506**			COURSE TITLE: ELECTRICAL WORKSHOP LAB				
COMPULSORY / OPTIONAL: **COMPULSORY**							
Teaching Scheme and Credits					EXAMINATION SCHEME		
L	T	P	HOURS/WEEEK	CREDIT	PE	FINAL	TOTAL
0	0	2	2	1	50	50	100

Course Objectives

This course envisions imparting to students to:

1.	State basic concepts of control systems and various methods to represent a system
2.	Illustrate and interpret a system using time domain techniques.
3.	Illustrate and interpret a system using frequency domain techniques.
4.	Identify Control problems and construct root locus, Bode plot and Nyquist plots for different systems
5.	Summarize and design controllers for systems.

Course Outcomes

After the completion of this course, students will be able to:

CO 1.	Understanding the operation of open loop and closed loop control systems.
CO 2.	Understanding the basics of Transfer function for representing and analyzing a system
CO 3.	Applying different stability methods of time domain in control systems.
CO 4.	Applying different stability methods of frequency domain in control systems.
CO 5.	Determine the characteristics of control system components

List of Experiments (The experiment list may vary to accommodate recent development in the field)

1. To study the performance of ON-OFF Temperature Controller.
2. To measure the resistance of a RTD at different temperatures
3. To learn the steady state speed of motor is ideally proportional to applied voltage
4. Choose a system like RC and RL and analyze its transfer function
5. To design and analyze characteristics of low pass and high pass filter circuit
6. To determine time domain response of first order system for step input
7. To determine time response of second order system for step input
8. To study P, PI and PID Controllers
9. To plot root locus diagram of an open loop transfer function
10. To plot bode plot of an open loop transfer function
11. To draw nyquist plot of an open loop transfer function and then find the stability of a closed loop transfer function.
12. To study performance characteristics of angular position error using two Potentiometer
13. To study performance characteristics of angular position error using syncho-transmiiter and receiver
14. To study performance of servo voltage stabilizer at various loads.
15. To study Speed Torque Characteristics Of AC Servo Motor

Books recommended:

Textbook:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	Control systems Engineering	I.J Nagrath , M.Gopal	9788122426090
2.	Control Systems	A.Anand Kumar	9788120349391

Reference book:

S. N.	Title	Author, Publisher, Edition and Year of publication	ISBN
1.	1. Modern Control System Theory- M. Gopal	M. Gopal.	9780470221570
2.	Modern Control Engineering	K. Ogata	9780136156734
3.	Control Systems	N. K. Sinha	9780470235614