Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)

Syllabus and
Evaluation Scheme

DIPLOMA
Electrical & Electronics Engineering

6TH SEMESTER

(Effective from Session: 2025-26)

EVOLUATION SCHEME

DIPLOMA –ELECTRICAL AND ELECTRONICS ENGG.

Study And Evaluation Scheme For Diploma Programme In EEE

SEMESTER-6

SUBJECT CODE	SUBJECTSNAME	STUDY SCHEME Periods/Week			Credits	Marks In Evaluation Scheme						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DENVIEX601	Environmental Education & Disaster Management	4	0	0	4	30	-	30	70	-	70	100
DINDUEX602	Industrial Drives & Control	4	1	0	5	30	-	30	70	-	70	100
DELECEX603	Electric Traction	4	1	0	5	30	-	30	70	-	70	100
DINDUEX604	Industrial Drives & Control LAB	0	0	2	1	-	25	25	-	25	25	50
DTROUEX605	Trouble Shooting And Servicing LAB	0	0	2	1	-	25	25	-	25	25	50
DPROJEX606	PROJECT	0	0	12	6	-	100	100	-	100	100	200
	Total	16	2	16	22	90	150	240	210	150	360	600

For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.

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DENVIEX601: ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

1. **INTRODUCTION:-** Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. Lowering of water level, Urbanization. Biodegradation and Biodegradability, composting, bio remediation, Microbes .Use of biopesticidies and bio fungicides. Global warning concerns, Ozone layer depletion, Greenhouse effect, Acid rain, etc.

2. POLLUTION:

Sources of pollution, natural and man-made, their effects on living environments and related legislation.

2.1 WATER POLLUTION:

- Factors contributing water pollution and their effect.
- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.
- Physical, Chemical and Biological Characteristics of waste water.
- Indian Standards for quality of drinking water.
- Indian Standards for quality of treated wastewater.
- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION:

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.
  A. Settling chambers
  B. Cyclones
  C. Scrubbers (Dry and Wet)
  D. Multi Clones
  E. Electro Static Precipitations
  F. Bog Fillers.
- Ambient air quality measurement and their standards. Process and domestic emission control Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION:

Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION:

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT:

Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION:

Preliminary knowledge of the following Act sand rules made there under-

- The Water (Prevention and Control of Pollution) Act -1974.
- The Air (Prevention and Control of Pollution) Act -1981.
- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act -1986 Viz.

  # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

  # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

  # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

  # The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.

  # Municipal Solid Wastes (Management and Handling) Rules, 2000.

  # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

- Basic concepts, objective and methodology of EIA.
- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT:

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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DINDUEX602: INDUSTRIAL DRIVES AND CONTROL

1. ELECTRICAL DRIVES:

1.1 An introduction to Electrical Drives
1.2 Advantages of Electrical Drives.
1.3 Parts of electrical drives- Electrical Motors, Power modulators, Sources, Control Unit.
1.4 Choice of Electrical Drives.
1.5 Status of DC and AC Drives.

2. DYNAMICS AND CONTROL OF ELECTRICAL DRIVES:

2.1 Fundamental Torque Equations.
2.2 Speed Torque conventions and multi quadrant operation.
2.3 Equivalent values of drive parameters.
  2.3.1 Load with rotational motion.
  2.3.2 Load with translation motion.
  2.3.3 Measurement of moment of inertia.
2.4 Components of load torques.
2.5 Nature and classification of load torques.
2.6 Calculation of time and energy loss in transient operation.
2.7 Steady state stability.
2.8 Load Equalization.
2.9 Speed control and drive classifications.
2.10 Closed-Loop Control of Drives.
  2.10.1 Current limit control
  2.10.2 Closed-loop torque control
  2.10.3 Speed sensing
  2.10.4 Phase locked loop (PLL) Control
  2.10.5 Closed loop position control.

3. SELECTION OF MOTOR POWER RATING:

3.1 Continuous Duty.
3.2 Equivalent current. Torque and power methods for fluctuating and intermittent loads.
3.3 Shot time duty.
3.4 Frequency of operation of motors. Subjected to intermittent load.

4. DC DRIVES:

4.1 Introduction
4.2 Basic Characteristics of DC Motors
4.3 Operating Modes.
4.4 Single phase drives.

4.4.1 Single Phase half wave converter Derives
4.4.2 Single Phase Semi converter Derives
4.4.3 Single Phase Full converter Derives
4.4.4 Single Phase Dual converter Derives

4.5 Three Phase drives-
4.5.1 Three Phase Half Wave Converter Drives
4.5.2 Three Phase Semi Converter Drives
4.5.3 Three Phase Full Converter Drives
4.5.4 Three Phase Dual Converter Drives

4.6 DC-DC Converter Drives-
4.6.1 Principle of Regenerative Break Control
4.6.2 Principle of Rheostatic Break Control
4.6.3 Principle of combined Regenerative &Rheostatic Break Control
4.6.4 Two & Four Quadrant DC-DC Converter Drives

4.7 **Closed Loop Control of DC Drives-**
4.7.1 Phase Locked Loop Control
4.7.2 Open Loop and Closed Loop Transfer Function.

5. AC DRIVES:
5.1 Introduction
5.2 Performance Characteristics
5.3 Rotor Voltage Control
5.4 Frequency Control
5.5 Voltage and Frequency Control
5.6 Current Control
5.7 Voltage, Current and Frequency Control
5.8 Closed Loop Control of Induction Motors.
5.9 Synchronous Motor Drives
5.9.1 Cylindrical Rotor Motor
5.9.2 Salient Pole Motor
5.9.3 Reluctanee Motor
5.9.4 Permanent Magnet Motors.
5.9.5 Switched Reluctance Motors.

6. TRACTION DRIVES:
6.1 Electric Traction services.
6.2 Nature of Traction Load
6.3 Braking
6.4 Important Features of Traction Drives.
6.5 Traction Motor-
6.5.1 Motor Employed in Traction
6.5.2 Traction Motor Control

6.6 **Traction Drives-**

6.6.1 A D.C. Traction drives employing resistance control.
6.6.2 25 KV, 50Hz, A.C.traction using on load transformers tapchanger.

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DELECEX603: ELECTRIC TRACTION

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1. Introduction:
Electric traction system and its advantages over other system, types of electric traction systems.Traction systems for India.

2. Electric traction drives:
Suitability of electric traction drives- D.C. series motor, A.C. series motor, 3 phase induction motor, characteristics of electric traction drives, special design requirements, methods of starting and speed control, different methods of braking, plugging, rheostatic, regenerative.

3. Power supply of electric traction:
Different systems of power supplies, their chronological evaluation, power supply arrangement i.e. traction substation major equipment transformer, circuit breaker, interrupter, protection system, remote control system, design consideration.

4. Mechanics of traction
System of units, speed time curves, their construction, simplification and interpretation for main line, suburban routs, tractive effort, specific energy consumption and factors effecting it. Weight transfer due to torque coefficient of adhesion.

5. Rectification Equipment
Equipment required for rectification their brief theory and working.

6. Overhead Equipment
Design aspects of overhead equipment catenary and its types, practical aspects of working, maintenance of overhead equipment, current collection system, their requirements.

7. Track Circuits
D.C.and A.C. track circuits, signals for traffic control,

8. Supervisory Remote Control
System of remote control, its advantages, mimic diagram, remote control system and network remote control center (R.C.C.)

9. Rail and Return Path
Earth returns protection of underground equipment, Negative booster, voltage distribution on rails.

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DINDUEX604: INDUSTRIAL DRIVES AND CONTROL LAB

1. Fabrication and testing of electronic fan speed regulator.
2. Study of serving motor and synchronous.
3. To study speed control of separately excited DC motor by varying armature voltage using single phase fully controlled bridge converter.
4. To study speed control of separately excited DC motor by varying armature voltage using single phase half controlled bridge converter.
5. To study speed control of separately excited DC motor using single dual converter.
6. To study speed control of separately excited DC motor using MOSFET/IGBT chopper.
7. To study speed control of single phase induction motor using single phase AC voltage controller.
8. To study speed control of Three Phase induction motor using Three Phase AC Voltage controller.
9. To study speed control of 3 Phase induction motor.
10. To study speed control of Three Phase Slip Ring Induction Motor using Static Rotor Resistance Control using Rectifier and Chopper.

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DTROUEX605: TROUBLE SHOOTING AND SERVICING LAB

GENERAL OBJECTIVES

After the completion this course the learner will be able to

1. Become familiar with identification and testing of common tools and components used in electrical and electronics.

2. Become familiar with fault finding/servicing of common domestic equipment.

3. Become familiar with procedure adopted for the trouble shooting/servicing such as symptoms analysis, circuit tracing, major measurement and signal injection and tracing etc. consisting of 4 to 5pages.

Students have to perform at least 10 types of trouble shooting/ servicing. Some of them are given-

1. Trouble shooting and servicing of common lab equipment such as multimeter, power supply, energy meter, CRO etc.
2. Trouble shooting and servicing of the following

- Room Heater
- Fans
- Tube Light
- Stabilizers
- Invertor
- House Wiring
- Radio Receiver
- Refrigerator
- Single/Three Phase Wiring
- DVD Player
- Electric Press
- DC Motors/Induction Motors (3 Phase and 1Phase)
- Single Phase and Three Phase Transformer

Other home/industrial appliance can also be included with consultation of the Faculty member.

In each exercise the circuit diagram, operating voltages at major point and the component replaced must be shown very clearly.

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DPROJEX606: PROJECT

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GENERAL OBJECTIVE:

Purpose of the project work is:

(i) To develop abilities of diagnosing problems.

(ii) To develop the abilities to:

(a) Make literature survey.
(b) Design/develop/fabricate/test simple circuits.
(c) Prepare documents for electronic work.
(d) Work as a team.

LIST OF PROJECTS (TO BE ASSESSED INTERNALLY):

The list of projects shown below is indicative of general nature and the complexity of work to be entrusted to students. (Teachers can modify this list to shut local needs and constraints keeping the level of complexity as suggested here).

1. To assemble and test a regulated power supply (15 V/1Amp).
2. To assemble and test a two stage R/c coupled amplifier and to calculate overall gain, loading effect and frequency response curve.
3. To assemble and test a invertors (500W).
4. To assemble and test the speed control of motor.
5. To assemble and test a battery charger with necessary control.
6. To assemble and test an automatic street light controller.
7. To assemble and test an automatic door opener/closer of a college/factory.
8. To assemble and test an audio amplifier (50W).
9. To assemble a AM/FM Radio receiver.

NOTE:-

1. Depending upon the complexity of the work, the teacher may assign any number of project works to a group. The group size will also be similarly decided by the teacher, normally between 2 to 4 students per group.

2. A project report (of about 100 typed computer pages) should submit covering the following points.

3. Basic design procedure for the project circuit.

4. Full block diagram and/or circuits diagram showing the component values.

5. Component layout diagram, including component and copper side details of the PCB used.

6. List of components used showing type's voltage/current ratings, tolerance values and other specifications.

7. Details of heat sink used IC and Transistor pin connections and types of packages.

8. Test and measurement procedure.

9. Discussion on the deviation of the results from the given specifications.

10. Estimating and costing with discussion about selection of components from cost point of view.

Note : Students should be taken for visits to nearest electrified railway track and railway station to study the electric traction system. Also visit should be made to show electric illumination in building