

**Program:** Diploma

**Semester:** Sixth

**Course:** Electrical Installation

**Course Code:** 6AD.354

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### Course Objective:

- Methods and techniques to install electrical equipment.
- Able to maintain electric equipments used in an industries
- Able to figure-out the different schemes of installation and its main components

### Unit I:

General guidelines for Installation: Location of site, planning & design of installation work, inspection before arrival of machine, procedure for inspection of an electric motor before installation, drying out of rotating m/c - necessities, steps in drying out, methods (in tabular form), measurement taken during drying out. Earthing Installation: System Earthing and equipment Earthing, Reasons for Earthing of electrical equipment, various Earthing systems, concept of touch voltage and step voltage, factors affecting earth resistance, methods of reducing the earth resistance, measurement of earth resistance General requirement of electric installation according to I.E. Rules: Rules 30-40, 43-51, 57, 61, 64, 68, 71. As per I.E. Rules type of Earthing required for supports of overhead lines.

### Unit II:

Panel boards installation showing back connections with necessary instruments, starters, protection equipment, switches, etc. of (i) Motor generator set for battery charging and to supply various loads. (ii) Synchronization of two alternators. Troubleshooting: Causes for failure of electrical equipment, classification of faults under - (i) Electrical, (ii) Mechanical, (iii) Magnetic.

### Unit III:

Tools and instruments used for troubleshooting and repair viz., Megger, Bridge-Megger, Ohmmeter, Multimeter, Growler, Tong Tester, Phase sequence indicator, etc. (Very short description with field of use) Use of troubleshooting charts. Detection & Remedies of faults in - (i) D. C. M/C, (ii) Transformer, (iii) Induction Motor - causes of noise & vibration, (v) Circuit Breakers, (vi) Starters, (viii) OH & UG lines, (ix) Domestic & Industrial wiring. (All in tabular form)

### Unit IV:

Electric Safety Regulations I.E. Act and rules, Statutory Regulation for safety of persons and equipment, Understand Do's & Don'ts listed in IS for substation & overhead operations.

Procedure for rescuing a person who has received an electric shock – CPR (Cardio Pulmonary Resuscitation) Causes of electrical fires - steps to deal with fire on electrical installations, class of fires, types of fire-extinguishers used - hand appliances comprising water, sand-bucket, and chemical extinguishers, e.g., Hose-reels, CO2 Extinguishers & chemical foam extinguisher

***Suggested Reading:***

1. *Brian Scaddan, Electrical Installation Work, Routledge*
2. *Trevor Linsley, Basic Electrical Installation Work*

**Program:** Diploma

**Semester:** Sixth

**Course:** Electrical Drives

**Course Code:** 6AD.356

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**Course Objective:**

- To develop and apply the knowledge of various power semiconductor devices in developing switching device.
- To prepare the students to develop and design different power converter circuits.
- To develop skills to build, and troubleshoot power electronics circuits.

**Unit – I:**

**Basics of Electrical Drives**

Electric drive, types, AC v/s DC drives, choice of electric drives , Parts of electrical drive- Source, power modulator, electric motor and control unit ,Selection of electric drive for applications: agricultural pumps, steel mills, paper mills, rolling mills, spinning mills, cement industries, chemical industries, refineries, shipping, power stations and automobiles

**Unit– II:**

**Dynamics of Electrical Drives**

Steady state load Torque speed characteristics, Multi quadrant operation of drives, Types of Braking-(a) Plugging, (b) dynamic/rheostat braking and (c) regenerative braking. Starters- Typical control circuits for shunt and series motors, three phase squirrel cage and slip ring induction motors

**Unit– III:**

**DC Drives**

Speed control of DC series and shunt motors – armature and field control. Solid state speed control of single phase and 3 phase DC drives with the following: i. half wave converter ii. Semi converter iii. Full converter iv. Dual converter, Solid state speed control of separately excited shunt and series motor drives, Chopper controlled drives

**UNIT IV:**

**AC Drives - Three Phase Induction Motor Drive**

Basic principle of 3 phases induction motor drive. Solid state control of 3 phase induction motor: i. Stator voltage control -3 phase AC voltage controller and soft start. ii. Stator variable frequency control voltage source inverter- PWM drives and current source inverter drives, cyclo converter fed IM drive. iii. Stator voltage and frequency control - Basics of V/f drive, scalar and vector or field oriented control of drives, V/f sensor less flux control drive. iv. Static rotor resistance control v.

**Suggested Reading:**

1. P. S. Bimbhra, *Electrical Machines*, Khanna Publishers
2. I. J. Nagrath, D.P. Kothari, *Electric Machines*, TMH, New Delhi, 2002
3. Gopal K. Dubey, *Fundamental of Electrical Drives*, Alpha Science
4. U.A. Bakshi, M.V. Bakshi, *Electrical Drives and Control*, Technical Publications Pune.

**Program:** Diploma

**Semester:** sixth

**Course:** Electrical Drives Lab

**Course Code:** 6ADP.353

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### List of Experiments:

1. To Study 1-phase Half & Full Controlled Converter.
2. To study AC to DC half-controlled converter.
3. To study AC to DC full-controlled converter
4. To study Characteristics of 1-phase Cycloconverter.
5. To Study 1-phase Half & Full Controlled Converter.
6. To study the construction of a three phase induction motor with the help of a model.
7. To study about the starters of three phase induction motors.

**Program:** Diploma

**Semester:** Sixth

**Course:** Control Engineering

**Course Code:** 6AD.355

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### Course Objective:

- Demonstrate an understanding of the fundamentals of control systems.
- Express and solve system equations in state-variable form (state variable models).
- Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some extent, ramp) inputs.
- Determine the (absolute) stability of a closed-loop control system

### Unit I:

Introduction to Control Systems: Classification of control systems, Examples of Feedback Control Systems, Properties of Control Systems: Stability, steady-state & transient errors, Errors and Error Constants, System types. Time response of system: Transient & steady state response of second order System and ramp response of second order system. Control actions: Proportional, integral,

### Unit II:

Concept of state, state variable, state model. State variable formulation of control system, Relating transfer function with state model. Time response of state model of linear time-invariant system.

### Unit III:

Introduction to Industrial Process Control. Modeling of Industrial process Control dynamics. Process Control terminology. Single loop control of standard first order process plants. Controller Implementation: Electronic, Analog,

### Unit IV:

Pneumatic Controllers: P, P-I, P-D, P-I-D control, Controller tuning, Ziegler-Nichlols method. Examples and features of Level Control, Flow Control, Temperature Control, Feed-forward control, Ratio Control, Multi-loop and Cascade control System. Introduction to Programmable Logic Control (PLC), its Features & Architecture, Ladder Diagram and Simple case Studies.

### Suggested Reading:

1. I.J. Nagrath, M. Gopal, *Control Systems Engineering*, New Age International Publishers
2. S. Hasan Saeed, *Control Systems*, Katson Books

**Program:** Diploma

**Semester:** Sixth

**Course:** Control Engineering Lab

**Course Code:** 6ADP.355

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### List of Experiments:

1. To generate the transfer function of open loop and closed loop transfer function of 1<sup>st</sup> order system in Octave.
2. To generate the transfer function of open loop and closed loop transfer function of 2<sup>nd</sup> order system in Octave.
3. Obtain creates a state-space model object representing the continuous-time state-space model with matrix A, B, C, D.
4. Conversion of the state space model to the transfer function model and then transfer function to state space model.
5. Obtain a pole –zero plot of a given transfer function.
6. Design a PD, PI controller in time and frequency domain.
7. Design a PID controller design in time and frequency domain.

**Program:** Diploma

**Semester:** Sixth

**Course:** Principle of Management

**Course Code:** 7D.351

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### Course Objective:

- Students will demonstrate their knowledge of business and management principles.
- Students will demonstrate critical-thinking and problem solving skills.
- Students will demonstrate effective written and oral communication
- Students will demonstrate an awareness of the global environment in which businesses operate
- Students will demonstrate an awareness of their own values
- Students will demonstrate the ability to recognize when change is needed, adapt to change as it occurs, and lead change
- Students will demonstrate an understanding of their personal interests, abilities, strengths, and weaknesses as the pertain to their chose career field

### Unit-I:

**Overview of Business:** Types of Business, Service, Manufacturing, Trade, Industrial sectors, Introduction to Engineering Industry, Process Industry, Textile Industry, Chemical Industry. Agro Industry, Globalization, Introduction, Advantages & disadvantages w.r.t India, Intellectual Property Rights I (I P R), Concept, Types of IPR.

### Unit-II:

**Management Process:** What is Management? Evolution, Various Definitions, **concept of management**, Levels of Management, Administration and Management, Functions of management: Planning, Organizing, coordinating, Directing, controlling, decision making.

**Organizational Management:** Organization, Definition, Steps in forming organization, Types of Organization, Line, Line & Staff, Authority & Responsibility, Span of Control (Management),

### Unit-III:

**Human Resource Management:** Personnel Management: Introduction, Definition & Function Staffing: Introduction to HR, Introduction to HR Planning, Recruitment procedure. Personnel – Training & Development: Types of training- Induction- Skill enhancement. Safety Management: Causes of Accidents, Safety Procedures.

**Unit-IV:**

**Financial Management:** Financial Management- Objectives & Functions, Capital Generation & Management, Types of capitals, Sources of finance.

***Suggested Reading:***

1. *Essentials of Management, Harold Koontz & Weirich: (Tata McGraw Hill)*
2. *Principles & Practices of Management, L.M. Prasad, S.Chand*
3. *Management, Stephen Robbins, INS P*



**Program:** Diploma

**Semester:** Sixth

**Course:** Project

**Course Code:** 6D.395

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**Course Objective:**

- To apply the knowledge gained throughout the courses in a practical and illustrative way.
- To develop the workability in a collaborative manner with a group of students.
- To develop abilities in problem solving and critical judgment
- To demonstrate ability to effectively collect, analyze and organize scientific information
- To develop the ability to write & prepare synopsis & dissertation.
- To develop the ability of presentation skill.
- To improve thinking ability.