# Integral University, Lucknow
## University Polytechnic
### Study and Evaluation Scheme
### Program: Diploma in Electrical Engineering

### Semester VI

| S. No. | Course Code | Course Title | Type of Paper | Period Per hr/week/sem | | | Evaluation Scheme | | | | Sub. Total | Credit | Total Credits | Attributes | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | CT | TA | Total | ESE | | | | Employability | Entrepreneurship | Skill Development | Gender Equality | Environment & Sustainability | Human Value | Professional Ethics |
| **THEORIES** | | | | | | | | | | | | | | | | | | | | |
| 1 | DEE-603 | Electrical Design Drawing and Estimating-II | Core | 03 | 01 | 00 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | Y | Y | Y | | | | |
| 2 | DEE-604 | Microprocessor Development System | Core | 03 | 01 | 00 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | Y | | Y | | | | |
| 3 | DEE-605 | Power Electronics-II | Core | 03 | 01 | 00 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | Y | | Y | | | | |
| 4 | DEE-606 | Control System | Core | 03 | 01 | 00 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | Y | | Y | | | | |
| 5 | DIM-601 | Industrial Management and Entrepreneurship Development | Core | 03 | 01 | 00 | 40 | 20 | 60 | 40 | 100 | 3:1:0 | 4 | Y | Y | Y | | | | Y |
| **PRACTICAL** | | | | | | | | | | | | | | | | | | | | |
| 6 | DEE-652 | Power Electronics-II Lab | Core | 00 | 00 | 03 | 40 | 20 | 60 | 40 | 100 | 0:0:1.5 | 1.5 | Y | | Y | | | | |
| 7 | DEE-653 | Electrical Drawing Lab | Core | 00 | 00 | 03 | 40 | 20 | 60 | 40 | 100 | 0:0:1.5 | 1.5 | Y | | Y | | | | |
| 8 | DEE-654 | Microprocessor Development Lab | Core | 00 | 00 | 03 | 40 | 20 | 60 | 40 | 100 | 0:0:1.5 | 1.5 | Y | | Y | | | | |
| 9 | DEE-656 | Project | Core | 00 | 00 | 03 | - | 120 | 120 | 80 | 200 | 0:0:1.5 | 1.5 | Y | Y | Y | | Y | Y | Y |
| 10 | GP-651 | General Proficiency | | - | - | - | - | - | 60 | | 60 | | | | | | | | Y | Y |
| **Total** | | | | 15 | 05 | 09 | 340 | 280 | 660 | 400 | 1060 | | 26 | | | | | | | |

# POWER ELECTRONICS-II
## (DEE-605)

L T P
3 1 0

### UNIT 1                                                                                      8

**CHOPPERS**
**Introduction:** DC-to-DC Converter. **Principle of chopper operation:** constant frequency system, variable frequency system. **Types of chopper circuit:** first quadrant or type A, second quadrant or type B, two quadrant or type C Chopper, two quadrant or type D chopper, voltage commutated thyristor chopper circuits

### UNIT 2                                                                                      8

**INVERTERS**
Introduction: **Single phase voltage source inverter:** single phase half bridge inverter, single phase full bridge inverter
**Force commutation thyristor inverter:** modified Mc Murray half bridge inverter, modified Mc Murray full bridge inverter
**Three phase inverter:** 180,120 degree mode, introduction to current source inverter, series inverter, parallel inverter

### UNIT 3                                                                                      8

**CYCLOCONVERTERS**
Introduction, **Single phase to single phase circuit step up cycloconverter:** mid point cycloconverters, bridge type cycloconverters
**Single phase to single phase circuit step down cycloconverters:** mid point cycloconverters, bridge type cycloconverters

### UNIT 4                                                                                      8

**ELECTRICAL DRIVE-I**
DC drives, introduction, basic performance equation of DC motors: separately excited DC motor., DC series Motor, DC shunt motor
Single phase DC drives: single phase half wave converter drives, single phase semi converter drives, single phase full wave converter drives, single phase dual converter drives
Chopper drives: motoring control, regenerative braking control

### UNIT 5                                                                                      8

**ELECTRICAL DRIVES-II**
**AC drives:** Introduction
**Induction motor drives:** Analysis and performance, **Speed control of Three Phase Induction Motor:** Stator Voltage control, Stator Frequency control, Stator Frequency and voltage control, Static Rotor resistance control, Slip energy recovery control

**Reference books:**
1 Industrial Electronics: D.C. Gupta
2 Indutrial Electronics and Control: Bhattacharya
3 Power Electronics: P.S.Bhimbra

# CONTROL SYSTEM
## DEE-606

**UNIT I**           **8**

**CONTROL SYSTEM: FUNCTIONAL ELEMENTS AND COMPONENTS**
Terminology , functional block diagram of open loop and closed loop control system (with examples), effect of feedback on system performance, servomechanism, modeling of a control system components- dc and ac tachometers, ac and dc servomotor

**UNIT II**           **8**

**BLOCK DIAGRAM AND TRANSFER FUNCTION**
Transfer function of physical system, block diagram algebra, block diagram reduction technique, signal flow graphs, rules for drawing signal graphs, mason gain formula, drawing signal flow graph from given block diagram. Order and type of control systems

**UNIT III**           **8**

**STABILITY ANALYSIS OF CONTROL SYSTEM**
Basic concept and definition of stability, location of root of characteristic equation, Routh–Hurwitz stability criterion, application of Routh- Hurwitz criterion

**UNIT IV**           **8**

**TIME RESPONSE ANALYSIS**
Transient and steady-state response, standard test signal, time response specifications of second order system, root locus technique, procedure for drawing root locus diagram

**UNIT V**           **8**

**FREQUENCY RESPONSE ANALYSIS**
Frequency response specification, Polar plot, Bode plot, procedure for drawing Bode plot and determination of gain margin, phase margin and stability

**Reference Books:**

1. B.S.Manke "linear control systems" khanna publishers, Delhi, Eight Edition: 2005
2. S Hasan Saeed "Automatic Control System"

# ELECTRICAL DESIGN DRAWING AND ESTIMATING -II

## (DEE-603)

**L T P**

**3 1 0**

### Unit 1

Principles of estimating and costing:
Purpose of estimating and costing, essential of estimating and costing-market survey, price list and net prices, preparation of lists of materials, calculation of material and labour cost, contingencies, overhead charges , profit and total cost                    8

### Unit 2

Earthing:
Need of earthing of electrical installation, advantages and disadvantages, effect of improper earthing, points to be earthed as per I.E. rules. Methods of earthing –plate and pipe earthing, determination of size of earth wire and earth plates for different capacities of electrical installations                    8

### Unit 3

Estimation of internal wiring installation:
Estimation of wiring installation for commercial and industrial building such as multistoried, hotels, hospitals, school, colleges, public library, etc. Power distribution scheme, lists of material with specification , estimation of costs. Estimation of power wiring; I.S. specification and I.E. rules determination of size of cables, conductors, distribution board, main switch and starters for power circuit, estimation and cost of material                    8

### Unit 4

Estimation o overhead and underground distribution lines:

Main components of overhead lines, specification of material for O.H. lines, cost of material and work for overhead and underground lines upto 11 KV only. Estimation of service connection ; service connection , their types and their estimation                    8

### Unit 5

Estimation of small substation:

  Main equipment and auxiliaries installed on the substation . estimation of material required for the small distribution substation. Costing of material and work of above substations        6

Ref Books:

1. Electrical Engineering Drawing and Estimation: K.B. Raina & S.K. Bhattacharharya

# Microprocessor Development System

## (DEE-604)

L T P

3 1 0

## UNIT-I

Introduction to Microprocessor, Evolution of Microprocessors, Memory map & Addresses, Address bus, Data Bus, Control Bus, Bus Structure, Memory Word Size, The 8085 Microprocessor Unit, Architecture & Description.　　　　　　　　　　8

## UNIT-II

Pin Diagram of 8085, Addressing Modes of 8085, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting and indexing, Additional data transfer and 16 bit arithmetic instruction, Arithmetic operations related to memory, Logic operation: rotate, compare, counter and time delays.　　　　　　　　　　8

## UNIT-III

Timing Diagram: Opcode Fetch, Memory Read Cycle, Memory Write Cycle, I/O Read & I/O Write. 8085 Interrupts: 8085 Vectored interrupts, Restart as Software instructions,

RIM, SIM.　　　　　　　　　　　　　　　　　　8

## UNIT-IV

Programs: 8-bit Addition, 16-bit Addition, 8-bit Subtraction, 16-bit subtraction, Subtraction with carry, Multiplication & Division.　　　　　　　　　　8

## UNIT-V

8255 Programmable peripheral interface: Block Diagram, Control Word, BSR Mode, Zero Mode. Introduction to 8086 microprocessor: Architecture of 8086, Flag Register of 8086, Register Organisation, Introduction to Microcontroller.　　　　　　8

**References:**

1. Microprocessor Architecture Programming & Application with 8085: R.S. Gaonkar
2. Microprocessor & Application: B. Ram
3. Microprocessor Development & Application: Majeedi

# INDUSTRIAL MANAGEMENT AND

# ENTREPRENEURSHIP DEVELOPMENT

## (DIM-601)

**L T P**
**3 1 0**

### UNIT-I
### PRINCIPLES OF MANAGEMENT

Definition of management, Administration organisation, Functions management, Planning, Organizing, Co-ordination and control, Structure and function of industrial organisations, Leadership- Need for leadership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress

Management.

### UNIT-II
### HUMAN RESOURCE DEVELOPMENT AND HUMAN AND INDUSTRIAL RELATIONS;

Introduction, Staff development and career development, Training strategies and methods. Human relations and performance in organisation, Understand self and others for effective behaviour, Industrial relation and disputes, Characteristics of group behaviour and Trade unionism, Mob psychology, Labour welfare, Workers participation in management.

### UNIT-III
### PERSONNEL AND FINANCIAL MANAGEMENT

Responsibilities of human resource management - Policies and functions, Selection - Mode of selection -Procedure - training of workers, Job evaluation and Merit rating - Objectives and importance wage and salary administration - Classification of wage, Payment schemes, Components of wage, Wage fixation. Fixed and working capital - resource of capital, Shares, types preference and equity shares, Debenture types, Public deposits, Factory costing, Direct cost, Indirect cost, Factory over head, Fixation of selling price of product, Depreciation- Causes, Methods.

## UNIT-IV
## MATERIAL MANAGEMENT, LABOUR, INDUSTRIAL AND TAX LAWS

Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card. Importance and necessity of industrial legislation, Types of labour laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax.

## UNIT-V
## ENTREPRENEURSHIP DEVELOPMENT AND
## INTELLECTUAL PROPERTY RIGHTS :

Concept of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for entrepreneurship development. Idea of project report preparation.

Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and Nonpatentable invention including product versus Process.

# POWER ELECTRONICS-II LAB
## (DEE-652)

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**0 0 3**

## Perform any ten experiments of the following

1. Study of voltage commutated chopper

2. Study of a Bedford inverter

3. Study of a single phase PWM inverter using MOSFET and IGBT

4. To understand the function of inverter trainer

5. To study the inverter circuit

6. To study the different faults and their troubleshooting in inverter circuit

7. To understand the function of inverter in presence of main supply and understand the charging of battery

8. Study of three phase half wave AC voltage controller with R load

9. Study of three phase full wave AC voltage controller with R load

10. Study of the application of SCR as a lamp flasher

11. Study the application of TRIAC as a lamp Dimmer

# ELECTRICAL DRAWING WORK LAB

## (DEE-653)

`                                                                    L T P

                                                                    0  0 3


1. Earthing                                                    1 sheet

2. Commercial and industrial building                    2 sheet

3. Stays , line crossings, line earthing , end pole

   and terminal pole, junction pole/ towers and

   transposition pole/ tower                             2 sheet

4. Power wiring layout and circuit                       2 sheet.

5. Service connection domestic , industrial

    And agriculture                                      2 sheet

6. Substation layout and busbar arrangement              2 sheet

7. Machine drawing induction and synchronous

   Machine                                               2 sheet

8. Winding of induction motor                            2 sheet

9. Winding of synchronous machine 3 phase                2 sheet

10. Reading and interpreting practical

    Drawing of wiring installation and

    Control                                              2 sheet

# MICROPROCESSOR DEVELOPMENT SYSTEM LAB

## (DEE-654)

**L T P**

**0 0 2**

1. Assembly language program: programming of simple problems

2. Simple programming problems using 8085, 8086 microprocessor kit to gain competence in the use of

a. 8085 instruction set.

b. Support chip or 8085.

c. Interfacing ADC/DAC chips IS 8085

d. Interfacing of display devices(seven segments)

e. Measurment of physical quantities like temperature, strain .

f. Speed contol of stepper motor.

g. Programming of 8051 controller