Diploma: Electrical Engineering
Semester-VI

L-2 T-0 P-2 C-3

HSDEE0200A Entrepreneurship and Skill Development

Course Objectives:

- To understand the diverse types of entrepreneurs and differentiate between entrepreneurs and entrepreneurs.
- To analyze entrepreneurship's role in economic growth and growth factors.
- To explore motives driving entrepreneurs: achievement, stress management, and training.
- To learn small enterprise basics: classification, ownership, project setup steps.
- To evaluate financial aspects: sources, management, taxation, and growth strategies

Course Outcomes:

1. Understand and understand the concepts of Entrepreneurial traits.
2. Apply Entrepreneurial development programs that suits to each individuals.
3. Analyze steps involved in setting-up a business and selecting business opportunities.
4. Evaluate comprehensive business plans, finance and accounting in relation to entrepreneurship.
5. Create support systems to zero down, by applying various measures

Articulation Matrix

(Program Articulation Matrix is formed by the strength of correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSo3
CO1	3	2	-	1	1	1	2	-	1	-	2	1
CO2	3	2	-	1	1	2	-	-	2	1	2	2
CO3	3	2	-	-	1	2	-	-	2	-	2	2
CO4	3	2	2	1	1	1	1	1	2	2	2	2
CO5	3	1	-	2	1	1	-	-	2	2	2	2

High-3 Medium-2 Low-1

Unit-I Entrepreneurship **6 Hours**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic growth, Factors affecting entrepreneurial growth.

Unit-II Entrepreneurial Motivation **6 Hours**

Major motives influencing an Entrepreneur – Achievement motivation training, self rating, business games, thematic appreciation test – stress management, entrepreneurship development programs – need, objectives.

Unit-III Entrepreneur Business **6 Hours**

Small Enterprises – Definition, Classification –Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

Unit- IV Finance and Accounting in relation to Entrepreneurship **6 Hours**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, and Taxation – Income Tax, GST.

Unit-V Support to Entrepreneurs **6 Hours**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

Total 30 Hours

Reference Books:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
2. Mathew J Manimala, "Entrepreneurship theory at cross roads: paradigms and praxis" 2nd Edition Dream tech, 2005.
3. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.
4. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers:
5. Entrepreneurship Development", Institute of India, Ahmadabad, 1986.

List of e-Learning Resources:

1. https://www.startupindia.gov.in/content/sih/en/reources/l-d-listing.html

Subject Expert	**Academic Coordinator**	**HoD**	**Appointed Senior Faculty by DoAA**

Diploma: Electrical Engineering
Semester-VI

L-2 T-1 P-0 C-3

OEDEN0201A PLC & SCADA

Course Objectives:

This course will expose students to –

- To define basics of PLC, its working & diagram as well as chronological evolution.
- To understand the PLC basic functions, wiring diagram and its hardware connection.
- To understand the PLC programming along with its instruction sets and applications.
- To define the architecture of DCS and SCADA system.
- To understand the basics of Industrial Automation.

Course Outcomes:

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

1. Define basics of PLC, its working, components & block diagram.
2. Analyze the PLC wiring and ladder diagrams for the various applications.
3. Apply PLC programming for different applications.
4. Understand the means of communication technologies used for DCS & SCADA system.
5. Analyze the need of safety in Industrial Automation.

Articulation Matrix

(Program Articulation Matrix is formed by the strength of correlation of COs with POs and PSOs. The strength of correlation is indicated as 3 for substantial (high), 2 for moderate (medium) correlation, and 1 for slight (low) correlation)

CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSo3
CO1	3	2	-	1	1	1	2	-	1	-	2	1
CO2	3	2	-	2	1	1	-	-	2	1	2	2
CO3	3	1	-	-	1	2	-	-	2	-	2	2
CO4	3	2	2	1	1	1	1	1	2	2	2	2
CO5	3	1	-	2	1	1	-	-	2	2	2	2

High-3 Medium-2 Low-1

Unit-I PLC Basics **6 Hours**

Introduction to PLC, block diagram for PLC, Advantage of PLC, Chronological Evolution of a PLC, Types of PLC

Unit-II PLC Functions **9 Hours**

PLC hardware, Timers & Counters, Relays, Ladder logic diagram, PLC Connection, Electrical wiring diagram, Advanced PLC functions like SKIP, MASTER CONTROL RELAY, JUMP with non return, jump with return.

Unit-III PLC Programming and Applications **9 Hours**

Introduction to Advance Instructions & Programming techniques of PLC. Discussions on Comparison Instruction i.e. “EQUAL”, “NOT EQUAL”“LESS THEN”, “LESS THEN OR EQUAL”, “GRATER THEN”, “MASKED COMPARISION FOR EQUAL”, PLC applications like bottling filling plant, material handling elevator etc.

Unit-IV DCS and SCADA **6 Hours**

Distributed control system (DCS), Industrial control systems (ICS),Industrial safety systems, SCADA and its SCADA.

Unit-V Industrial Automation **6 Hours**

Introduction to industrial automation, Sample examples of automation and selection of PLC for different applications.

Unit-VI HMI (Human Machine Interface) of ALLEN BRADLEY **9 Hours**

Getting started with HMI, creating applications, creating tags, Downloading and uploading Programs, Creating GUI Screen on the HMI, Alarm Messages, Communicating with PLC and Fault diagnostics and Troubleshooting.

Total 45 Hours

Reference Books:

1. PLCs & SCADA: Theory and Practice by Rajesh Mishra & Vikrant Vij,Laxmi Publications, New Delhi, Latest edition.
2. Computer Based Industrial Control by Krishna Kant, PHI, New Delhi, Latest edition.
3. Programmable Logic Controllers Principles and applications by Webb John W. and Reis A. Ronald, PHI, New Delhi, Latest edition.

List of e-Learning Resources:

1. http://www.digimat.in/nptel/courses/video/108108099/L30.html
2. www.plcsimulator.net

Subject Expert **Academic Coordinator** **HoD** **Appointed Senior Faculty by DoAA**

Mandsaur University

Diploma Electrical Engineering

Semester-VI

L-2 T-1 P-2 C-4

PCDEE0150A Power Electronics & Drives

Course Objectives

- To understand and acquire knowledge about various power semiconductor devices
- To know the working of various phase-controlled rectifier
- To compare different types of chopper circuit
- To understand the operation of single phase and three phase bridge inverters
- To understand the operation of converter fed A.C and D.C drives and their control

Course Outcomes (COs)

1. Remember types of power semiconductor devices and their characteristics
2. Understand the operational principles behind various power electronic circuits and systems
3. Apply circuit analysis techniques to solve problems related to power electronics and drives
4. Analyze the performance of power electronic converters under varying loads and conditions
5. Evaluate the economic and environmental impact of power electronics technology

Articulation Matrix

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CO/PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CO1	3	2	1	2	-	1	1	-	-	1	1	1
CO2	2	3	1	2	-	1	1	-	-	2	1	1
CO3	2	3	1	2	-	1	1	-	-	2	1	1
CO4	3	2	1	1	-	1	1	-	-	1	1	1
CO5	3	2	1	1	-	1	1	-	-	1	1	1

High-3Medium-2Low-1

Unit 1 Introduction to Power Electronics Devices **9 Hours**

Introduction to Power Electronics & devices, Working principles &V-I characteristic of devices: Thyristor family (SCR),Transistor family (Power BJT, Power MOSFET & Power IGBT), Turn on methods of SCR, Firing circuits of SCR (R, R-C, Cosine law), Protection of SCR, Gate drive circuits for MOSFET and IGBT, Voltage and current commutation of SCR. Application of power semiconductor devices

Unit II A.C to D.C controlled converters **9 Hours**

Principle of phase control, Single-phase half wave and full wave controlled converter with R & R-L

load, Use of freewheeling diode, Single phase semi-converter with R & RL load, Three- phase full converter & three-phase semi converter with R &R-L load

Unit III D.C to D.C& D.C to A.C controlled converters 9 Hours

D.C to D.C converter: (Types of chopper, Principle of operation of step up &step down chopper ,concepts of duty ratio and average voltage), D.C to A.C converter: Principle of operation of Single phase half and full bridge Inverter, 3-Phase Inverters-180^0 mode conduction, 120^0 mode conduction, series & parallel inverter, Introduction to current source inverter

Unit IV D.C motor drives 9 Hours

Block diagram of electric drive system, D.C motors and their performances, speed control, Methods of armature voltage control, Braking of D.C motors (series & shunt), Controlled Rectifier Fed DC Drives, and Chopper Fed D.C Drives

Unit V A.C motor drives 9 Hours

Induction Motor Drives: Speed Control, Stator Voltage Control, V/f control using Voltage source inverter, Rotor Resistance Control & Slip Power Recovery

Synchronous Motor Drives: Variable Frequency Control of Multiple Synchronous Motors

Total: 45 Hours

PRACTICALS:

1. Study introduction to power electronics and its applications
2. Study of power semiconductor devices
3. Plot and verify SCR characteristics
4. Plot and verify V-I characteristics of a Triac
5. Plot V-I characteristics of UJT
6. Plot V-I characteristics of a DIAC
7. Study and perform single-phase half-wave circuit with RL load
8. Study 3Φ fully controlled converter
9. Perform speed control of DC motor using SCR
10. Study and perform DC-DC step-up converter
11. Study of type A, B & C chopper circuit
12. Study of different types of braking
13. Study of single-phase dual converter drives
14. Study of two-quadrant and four-quadrant chopper drives
15. Fabrication of three-phase bridge rectifier using two SCR and two diodes

16. Fabrication of three-phase bridge rectifier using diodes

Total: 75 Hours

References:

1. M.D. Singh, K.B. Khanchandani, (2001) Power Electronics, TMH ,Delhi
2. ChakravartiA.(2006),FundamentalofPowerElectronicsandDrives,DhanpatRay&Co
3. Dr. P.S. Bhimbhra (2004),Power Electonics, Khanna Pub
4. Vedam Subramanyam(2006),Power Electronics New Age International Revised IIed
5. Gopal K. Dubey(2001), Fundamentals of Electrical Drives, Alpha Science International Limited

List of e-Learning Resources:

1. https://nptel.ac.in/ courses/108/102/108102145
2. https://www.coursera.org/specializations/power-electronics

Subject Expert	**Academic Coordinator**	**HoD**	**Appointed Senior Faculty by DoAA**

Diploma Electrical Engineering

Semester-VI

L-2 T-1 P-2 C-4

PEDEE0401A Microprocessors & Microcontroller

Course Objectives:

- To understand the basic concept of microprocessors (8085 & 8086) architectures.
- To contrast various decision-making aspects in applications with help of microprocessors and its programming.
- To apply interfacing methods of various ICs with processors
- To extrapolate the basic concept of microcontroller architectures
- To generalized 8051 interfacing to I/o devices

Course Outcomes:

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

1. Understand the concept of microprocessors 8085 architectures and its working.
2. Understand the concept of microprocessors 8086 architectures and its working.
3. Apply various assembly language programs and execute them on software.
4. Analyze to interface various ICs with microprocessors and microcontroller
5. Crate 8051 interfacing modules and I/o devices

Articulation Matrix

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CO2	2	2	3	2	2	1	2	-	2	1	2	2
CO3	3	1	2	1	2	2	1	2	1	2	2	1
CO4	2	2	2	2	2	1	2	2	2	3	2	2
CO5	3	2	2	3	2	2	2	-	2	3	2	2

High-3 Medium-2 Low-1

Unit-I 8085 Microprocessor **10 Hour**

Introduction to 8085 microprocessor and its architecture. Microprocessor bus organization: data bus, address bus and control bus – instruction set of 8085 processor. Programming techniques of 8085.

Unit-II 8086 Microprocessor **10 Hour**

Intel 8086 microprocessor – Architecture – Instruction set and assembler directives – Addressing modes – Assembly language programming. Interrupts and interrupt service routines.

Unit-III I/O Interfacing **9 Hour**

Memory Interfacing and I/O interfacing - Parallel communication interface-Serial communication interface. DMA controller – Programming and applications.

Unit-IV Microcontrollers **9 Hour**

Introduction to Atmel 8051 microcontrollers. Architecture of 8051. Memory and I/O port addressing. Interrupts. Instruction set and applications of microcontrollers.

Unit-V Microcontroller 8051 interfacing **10 Hour**

Interfacing to I/O devices, stepper motor interfacing, 8051 serial communication and its basic modes, interfacing to LCD modules and its programming.

Total: 45 Hours

Practical List:

1. To study the 8085 Microprocessor
2. To study different register organization of 8086 Microprocessor
3. To perform the addition and subtraction of two 16- bit number using microprocessor 8086
4. To perform multiplication and division of 8- bit number using microprocessor 8086.
5. To perform logical operation like AND, OR, and NOT using microprocessor 8086
6. To perform logical operation like NAND, NOR, and X-OR using microprocessor 8086
7. To perform and form squares and cubes series using microprocessor 8086
8. To perform and form increment/decrement series
9. To study the 8051 Microcontroller
10. To perform arithmetic program in microcontroller 8051

Total: 75 Hours

Reference(s)

1. A.K. Ray &K. M. Bhurchandi, Advanced Microprocessors and peripherals- Architecture, Programming and Interfacing, Tata McGraw-Hill.
2. R. S. Gaonkar. Microprocessor Architecture, Programming, and Application with the 8085.
3. Kenneth J. Ayala, The 8086 microprocessor: programming and interfacing the PC.
4. Muhammad Ali Mazidi and Janice Gillespie Mazidi, The 8051 Microcontroller and Embedded Systems, Pearson education, 2005.
5. Udayashankara and M.S. Mallikarjunaswamy, 8051 Microcontroller: Hardware, Software & Applications, Tata McGraw-Hill, 2009.

6. McKinley, The 8051 Microcontroller and Embedded Systems-using assembly and C, PHI, 2006 / Pearson, 2006.

List of e-Learning Resources:

3. https://nptel.ac.in/courses/117104072
4. https://www.coursera.org/learn/comparch

Subject Expert	**Academic Coordinator**	**HoD**	**Appointed Senior Faculty by DoAA**