REVISED COURSE CURRICULUM FOR 6TH SEMESTER

(Diploma in IC Manufacturing Engineering)

W.E.F.2025-26

BOARD OF TECHNICAL EDUCATION

MUNI MAYA RAM MARG PITAMPURA,

DELHI-110034

STUDY SCHEME / CREDIT (SEMESTER – VI) IC MANUFECTURING ENGG.

Sl.	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs./ week	Credits	Internal Marks	External Marks
									Time	Time
				L	T	P			1:30 Hrs. (Each Sessional)	3:00 Hrs.
1	Program core Course	23IM-PC-302	Safety Protocols for IC foundry	3	0	0	3	**3**	50	100
2	Program Elective Course (Prog Elect-II)	23IM-PE-304	1.Industrial Automation	3	0	0	3	**3**	50	100
3		23DE-PE-306	2.VLSI Design							
4	Open Elective Course (Open Elect-II)	23MD-OE-308	1.Advance Medical System	3	0	0	3	**3**	50	100
5		23EC-OE-310*	2.Internet of Things (IOT)							
6	MANDATORY COURSE	23HS-300	Entrepreneurship and Start-ups	3	1	0	4	**4**	50	100
7	Program Elective Course LAB (Prog Elect-II)	23IM-PE-352	1.Industrial Automation LAB	0	0	4	4	**2**	50	100
8		23DE-PE-354	2.VLSI Design LAB							
9	Open Elective Course LAB (Open Elect-II)	23MD-OE-356	1.Advance Medical Systems Laboratory	0	0	4	4	**2**	50	100
10		23EC-OE-358*	2.Internet of Things (IOT) Laboratory							
11	PROJECT	23IM-PR-360	Major Project	0	0	8	8	**4**	100	100
12	SEMINAR	23IM-SE-362	SEMINAR	0	1	0	1	**1**	50	-
								Total Credits	**22**	**450**	**700**
								Grand Total		**1150**	

***This subject is same as in Computer Engineering, subject code: 23-CO-PE-310 and 23-CO-PE-358**

As per AICTE Guidelines:

Teachers should use the following strategies to achieve the various outcomes of the course.

- Different methods of teaching and media to be used to attain classroom attention.
- Massive open online courses (MOOCs) may be used to teach various topics/subtopics.
- 15-20% of the topics which are relatively simpler or descriptive in nature should be given to the students for self-learning and assess the development of competency through classroom presentations.
- Case Studies/Micro-projects may be given to group of students for hand-on experiences
- However, Students will be required to appear for the exams STRICTLY as per the scheme of exam as proposed by Board of Technical Education, GNCT of Delhi.

Course Code	:	**23IM-PC-302**
Course Title	:	**Safety Protocols for IC foundry**
Number of Credits	:	**3**(L: 3, T: 0, P: 0)
Course Category	:	Program Core

Objective:

The objective of studying safety protocols for an IC foundry is:

- Identifying and assessing hazards
- Understanding safety controls
- Complying with regulations
- Minimizing environmental impact
- Ensuring business continuity

Course Contents:

1. Introduction to various types of safety hazards in a fab, e.g. general, chemical, gas, and radiation. NFPA 704 diamond, signage. **[3 Hrs.]**
2. Basics of clean room, layout, and operation from the perspective of safety. Balance of air intake, pressure, & exhaust. **[3 Hrs.]**
3. General safety: Basics of fire safety; extinguishers; emergency response plan; high-voltage safety; PPE; incident reporting; management of change; If possible, demonstration/practical of fire extinguisher. **[5 Hrs.]**
4. Chemical safety: Classification of hazards; Practical aspects like segregation, spill-control & responsible disposal; Mixing of acids and solvents; Toxicity of effluents; Case study of fluorides in clean room; If possible, demonstration/practical of RCA clean. **[5 Hrs.]**
5. Gas safety: Type of gasses; PEL and TEL; Practical handling of gases, including storage, usage and transport; Toxic gas system components like sensors, coaxial lines, gas cabinets, valve-manifold and standard-operating procedures for cylinder change; Case study of H2 usage; If possible, demonstration/practical of SCBA. [**5 Hrs.]**
6. Radiation safety: Lasers; UV sources; **[2 Hrs.]**
7. Structured qualitative risk analysis techniques like bowtie; Definition of concepts like Hazards, Top Events, Threats and Consequences; Understand prevention and mitigation strategies; Case studies of SiH4 hazard **[4 Hrs.]**
8. Quantification of hazards; Blast radius calculation of gases like SiH4; case studies; Six sigma. **[3 Hrs.]**
9. Discussion of one industry safety standards from CGA, SEMI, or ASTM. **[3 Hrs.]**

Text Book/References:

1. Semiconductor Safety Handbook: Safety and Health in the Semiconductor Industry (Semiconductor Safety Series) by Richard A. Bolmen
2. Semiconductor Manufacturing Risk Handbook by Vincent A. Degiorgio MS
3. Handbook of Chemicals and Gases for the Semiconductor Industry by N. Irving Sax and Richard J. Lewis Sr
4. Introduction to Mechatronic Design by J. Edward Carryer, Matthew Ohline, Thomas Kenny. Pearson
5. A User's Guide to Vacuum Technology by John F. O'Hanlon. Wiley
6. Handbook of Vacuum Technology, edited by Karl Jousten, Wiley
7. SEMI S2/S8 guidelines.

Virtual reality (VR) training:

- VR simulators offer immersive training for clean room procedures, allowing trainees to practice gowning, tool handling, and contamination control in a safe and controlled virtual environment, reducing training time and increasing compliance, notes Kewaunee.
- VR can simulate hazardous scenarios like chemical spills or equipment malfunctions, allowing workers to practice their response without real-world risks, improving hazard recognition and emergency preparedness.

Course Code	:	**23IM-PE-304**
Course Title	:	**Industrial Automation**
Number of Credits	:	3(L: 3; T: 0; P:0)
Course Category	:	Program Elective

Course Objectives: It is important for the students to learn the basics of automation, how systems work and the importance of PLC, SCADA and robots in automation. This course will provide an opportunity to learn industrial automation techniques

Course Content:

UNIT-I: **Introduction** **[4 Hrs.]**

Automation overview, Requirement of automation systems, Architecture of Industrial Automation system, Introduction of PLC and supervisory control and data acquisition (SCADA). Industrial bus systems: Modbus & Profibus. Role of computers in measurement and control.

UNIT-II: **Automation Components** **[8 Hrs.]**

Sensors for temperature, pressure, force, displacement, speed, flow, level, humidity and pH measurement. Actuators, process control valves, power electronics devices DIAC, TRIAC, power MOSFET and IGBT. Introduction of DC and AC servo drives for motion control.

UNIT-III: **Automation in Process Industries** **[10 Hrs.]**

Introduction to computer based industrial automation. Programmable Logic Controller (PLC)- Block diagram of PLC, Programming languages of PLC, Basic instruction sets, Design of alarm and interlocks, Networking of PLC, Overview of safety of PLC with case studies. PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries, Process Safety Automation, Levels of process safety through use of PLCs, Application of international standards in process safety control.

UNIT-IV: **Distributed Control System** **[8 Hrs.]**

Overview of DCS, DCS software configuration, DCS communication, DCS Supervisory Computer Tasks, DCS integration with PLC and Computers, Features of DCS, Advantages of DCS. Introduction to communication protocols - Profibus, Field bus, HART protocols, etc.

UNIT-V: **Process Control** **[6 Hrs.]**

Sequence control, Control of Machine Tools, Hydraulic & Pneumatic Control Systems, Motor Drives, Introduction, Characteristics, Adjustable Speed Drives, Basic construction and configuration of robot, Pick and place robot, Welding robot, Spray robot, etc.

References:

- **Books Recommended:**

1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI
3. Programmable logic controller, Dunning, Delmar

- **List of Open-Source Software/learning website:**

1. NPTEL, online courses and certification, Learn for free
2. Swayam Central
3. NPTEL :: https://nptel.ac.in/courses/108/105/108105062/

Course Outcomes:

1. Explain automation components and systems application
2. Identify suitable industrial automation hardware for given application
3. Measure industrial parameters like temperature, pressure, force, displacement, speed, flow, level, humidity and pH.
4. Impart the role of PLC in industry automation
5. Expose to various control techniques employed in process automation.

Course Code	:	**23IM-PE-352**
Course Title	:	**Industrial Automation Laboratory**
Number of Credits	:	2 (L:0,T:0,P: 4)
Course Category	:	Program Elective

EXPERIMENTS:
1.Introduction of automation system and symbols

2.Introduction about plc system and its programming

3. Study of HART and Field bus protocol

4. Study of Distributed Control System and different instruction sets.

5. Study of Distributed Control System and different instruction sets.

6. Development of combinational and sequential logic application using minimum PLC languages

7. Design and development of IoT based transmitter

8. Write and implement a simple ladder logic program to study and verify AND gate using digital inputs and outputs

for PLC.

9.To perform the simulation of single acting cylinder with use of automation software.

10.To perform the simulation of Double acting cylinder with use of automation software.

Suggested Open-ended Experiments:
Student's can-do open-ended experiments as a group of 3-5. There is no duplication in experiments in between groups. This is mainly for the purpose of continuous internal evaluation. Students should prepare a separate report on an open-ended experiment of their choice.
Example: Develop a water level control circuit using PLC.

A few of the most popular open source IT automation tools include:

- Puppet
- Chef
- Ansible
- Salt
- CFEngine
- Rudder

Course Code	:	**23DE-PE-306**
Course Title	:	**VLSI Design**
Number of Credits	:	3(L: 3, T: 0, P: 0)
Course Category	:	Program Elective

Course Objective:

1) Understand Basic CMOS Circuits
2) Explain CMOS process technology
3) Techniques of chip design using programmable devices.
4) Identify the various IC fabrication methods.
5) Develop codes through VHDL programming for VLSI based electronic systems.

Course Content:

Unit – 1:Introduction **[6 Hrs.]**

Introduction to IC – MOS, PMOS, NMOS, CMOS & BICMOS technologies, IC Fabrication: and CMOS fabrication

Unit– 2: Basic Electrical Properties of MOS Circuits **[6 Hrs.]**

Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit, NMOS Inverter, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Unit- 3: VLSI Circuit Design Processes **[10 Hrs.]**

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and layout, CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters. Scaling of MOS circuits, Limitations of Scaling, Shorts Channel Effects.

Unit- 4: Semiconductor Integrated Circuit Design **[6 Hrs.]**

PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design of CMOS Logic Gates and Other complex gates

Unit- 5: VHDL Programming **[12 Hrs.]**

Introduction to HDL, Features of VHDL – Entity, Types of architecture – Structural, Behavioral and Data flow, Different types of statements: Concurrent and Sequential, Simulation and Synthesis. Modeling of combinational and sequential circuits.

Reference Books:

S. No.	Title of Book	Author	Publication
1	CMOS digital integrated circuits.	S. M.Kang	TMH
2	Basic VLSI design	K.Esharaghian, & D. A. Pucknell,	PHI
3	Introduction to VLSI circuits and systems.	J. P.Uyemura	Wiley
4	Circuit design with VHDL	V. A.Pedroni	PHI

Online Resources

https://nptel.ac.in/courses/117106092

https://vlsiresources.com/

http://www.youtube.com/watch?v=9SnR3M3CIm4

https://nptel.ac.in/courses/117108040

Course Outcomes:

1) Describe the evolution and fabrication techniques of IC technologies including MOS, CMOS, PMOS, NMOS, and BiCMOS.

2) Analyze the electrical characteristics of MOS transistors and evaluate the performance of NMOS, CMOS, and BiCMOS inverters.

3) Interpret the VLSI design flow and apply stick diagrams, design rules, and layout techniques for basic MOS circuits.

4) Explain the architecture and working principles of various programmable logic devices such as PLAs, FPGAs, and CPLDs, and design CMOS logic gates.

5) Develop VHDL models for combinational and sequential digital circuits using structural, behavioural, and dataflow modelling styles.

Course Code	:	**23DE-PE-354**
Course Title	:	**VLSI Design LAB**
Number of Credits	:	2 (L: 0,T: 0,P: 4)
Course Category	:	Program elective

List of Practical: (Any 8 based on the availability of software/simulators)

1. Identify VHDL entities and coding styles.

2. Simulate the Basic logic gates using VHDL.

3. Simulate the Universal logic gates using VHDL

4. Simulate X-OR and X-NOR logic gates using VHDL

5. Simulate Half Adder & Full Adder using VHDL

6. Simulate Half Subtractor & Full Subtractor using VHDL

7.Simulate 3x8 de-coder using VHDL

8. Simulate 4 : 1 mux using VHDL

9. Simulate 1 : 4 de-mux using VHDL

10 . Simulate SR flip-flops using VHDL

Course Code	:	**23MD-OE-308**
Course Title	:	**Advanced Medical Systems**
Number of Credits	:	3(L:3,T: 0,P:0)
Course Category	:	**OE**

Course Objective:

The students are made fully conversant with the functions, working principle, construction, merits and applications of various medical systems through the study of this subject. Various equipment to be Covered with focused on the OT equipment and Neonatal Equipment, like ESU, Anesthesia Machine,OT Table, OT Light, patient monitoring system, phototherapy etc. It also cover some specific advance equipment and system like Haemodialysis Machine.

Course Content:

Unit – 1: OT Table **[4 Hrs.]**
Purpose of operation theatre table, Types of OT Table – Hydraulic, Electrohydraulic and Electrical Powered, Block Diagram and components, Different function and Controls –Trendelenburg, Anti-Trendelenburg, Standard specification of OT table.

Unit– 2: OT Light **[3 Hrs.]**
Purpose of OT light, Operating Principle, Intensity Control, Shadow reduction, Technical Specification and maintenance.

Unit– 3: Anesthesia Machine **[4 Hrs.]**
Need for Anesthesia, Anesthesia delivery system, Gases used in Anesthesia, Block diagram of anesthesia machine, Components of anesthesia machine, Breathing Circuit (Semi-closed Circle System), Fail safe system, Vaporizers, Circle System Components, Anesthesia Ventilator – Function and different modes.

Unit 4: Electrosurgical Unit (ESU) **[4 Hrs.]**
Principle of Operation, Cutting, Coagulation and blending waveforms, Block Diagram and Components, ESU modes – Monopolar & Bipolar, Patient Return Electrode Monitoring, Safety aspect in ESU.

Unit- 5:Patient Monitoring System **[8 Hrs.]**
Purpose, parameters measured. Measurement of ECG, SpO2, NIBP, Respiration, Temperature, ETCO2. Central monitoring system.

Unit- 6: Phototherapy Unit **[4 Hrs.]**
Purpose, Operating Principle, Fibreoptic Pad, Technical Specification, Testing of Phototherapy Unit.

Unit- 7: Radiant Warmer **[4 Hrs.]**
Purpose, Operating Principle, Bassinet, Resuscitation module, Warmer Head, Technical Specification, Testing of Radiant Warmer.

Unit- 8: Baby Incubator **[4 Hrs.]**
Purpose, Operating Principle, Block Diagram, Heater and Temperature Control, Humidity Control, Oxygen Control, Technical Specification

Unit- 9: Haemodialysis Machine **[4 Hrs.]**
Purpose, Principle of Operation, Types of Dialysis, Block Diagram and Components, Dialyzers, Advantages & Disadvantages.

Reference Books:

S. No.	Title of Book	Author	Publication
1	HANDBOOKOF BIOMEDICAL INSTRUMENTATION	R S Khandpur	McGraw-HillEducation India
2	Introduction to BIOMEDICAL EQUIPMENTTECHNOLOGY	Joseph J. Carr & John M. Brown	
3	Encyclopedia of Medical Devices and Instrumentation Vol. I, II, III, IV	John G. Webster	Marcel Dekkar Pub

Lectures:

http://www.vlab.com
https://www.youtube.com/watch?v=5l8jCjSVnHs
https://www.youtube.com/watch?v=5o1ape2Pz9M
https://en.wikipedia.org/wiki/Hemodialysis

Course Outcomes:

1. Understand the concept and operation of various operation theatre equipment like anesthesia machine, ESU, OT Table, OT light etc.
2. Understand the concept and operation of various neonatal equipment like Phototherapy unit, Radiant warmer, Baby Incubator.
3. Understand the concept and operation of advance equipment like Haemodialysis machine.
4. Troubleshoot various medical equipment.
5. Carryout installation and testing of various medical equipment.

Course Code	:	**23MD-OE-356**
Course Title	:	**Advanced Medical Systems LAB**
Number of Credits	:	2(L:0,T: 0 ,P:4)
Course Category	:	Open Elective

List of Practical:

1. Study of operation and control of Anaesthesia Machine.
2. Study of operation and control of ESU Machine.
3. Testing of Leakage current and preinstallation requirement of ESU using electrical safety analyser.
4. Study of operation and control of Phototherapy Machine.
5. Functional parameter testing of Phototherapy machine by irradiance meter.
6. Measurement of ECG, SpO2, NIBP and Heartrate using patient monitor.
7. Testing of Leakage current and preinstallation requirement of patient monitor using electrical safety analyser.
8. Study of operation and control of Baby Incubator.
9. Study of operation and control of Radiant warmer.

Course Code	**23EC-OE-310**
Course Title	**Internet of Things**
Credits	3 (L: 3 T: 0 P: 0)
Course Category	Open Elective

Course Objective:
By the end of this course, students will be able to:

- Understand the core concepts, architecture, and applications of IoT.
- Explore the role of sensors, microcontrollers, communication protocols, and cloud platforms.
- Gain hands-on experience in building simple IoT systems using Arduino/Raspberry Pi.
- Learn about data transmission, storage, and analysis in IoT.
- Understand IoT use cases in smart cities, healthcare, agriculture, and industry.

Course Content:

Unit 1	Introduction to IoT What is IoT? History and evolution; Characteristics and scope of IoT; IoT vs Traditional Internet; IoT architecture: Perception, Network, and Application layers; Applications: Smart Home, Smart Agriculture, Smart Cities, etc.	**[6 Hrs.]**
Unit 2	IoT Hardware and Sensors Sensors and Actuators: Types and applications; Microcontrollers: Arduino, Raspberry Pi – features and use; Communication Interfaces: GPIO, I2C, SPI, UART; Power management and energy harvesting	**[6 Hrs.]**
Unit 3	Networking and Communication Networking Basics: IP, TCP/UDP; IoT Protocols: MQTT, CoAP, HTTP, Bluetooth, ZigBee, LoRa, Wi-Fi; Data Formats: JSON, XML; Cloud integration for IoT	**[7 Hrs.]**
Unit 4	IoT Software and Platforms IoT programming tools: Arduino IDE, Python; Embedded OS (basics): Raspbian; Cloud platforms: ThingSpeak, Blynk, Firebase; Real-time data monitoring and visualization	**[7 Hrs.]**
Unit 5	IoT Applications and Security Case Studies: Smart Energy, Smart Health, Smart Environment; IoT Security: Threats, vulnerabilities, and mitigation; Data privacy and ethical concerns; Future trends in IoT and Industrial IoT (IIoT)	**[6 Hrs.]**

Course Outcome:
Upon successful completion of the course, students will be able to:

- CO1: Describe the architecture and components of IoT systems.
- CO2: Interface sensors and actuators with microcontrollers.
- CO3: Apply networking concepts to enable IoT communication.
- CO4: Design and implement basic IoT applications using Arduino or Raspberry Pi.
- CO5: Analyze data generated by IoT systems and interface with cloud platforms.

Text Books

1. "Internet of Things: A Hands-On Approach" – Arshdeep Bahga, Vijay Madisetti, Universities Press, 2014.
2. "Internet of Things" – Raj Kamal, McGraw Hill Education, 2017.

Reference Books:

1. "Getting Started with Raspberry Pi" – Matt Richardson & Shawn Wallace, O'Reilly, 2014.
2. "Designing the Internet of Things" – Adrian McEwen & Hakim Cassimally, Wiley, 2013.
3. "IoT Fundamentals: Networking Technologies, Protocols and Use Cases" – David Hanes et al., Cisco Press, 2017.

Online Resources:

1. https://swayam.gov.in/nd1_noc20_cs91
2. https://nptel.ac.in/courses/108/108/108108098/
3. https://swayam.gov.in/nd2_cec20_cs09

Course Code	**23EC-OE-358**
Course Title	**Internet of Things LAB**
Credits	2(L: 0 T: 0 P:4)
Course Category	Open Elective

List of Experiments (**Any 8 to10 based on the availability of software/simulators**):

1. Getting started with Arduino: LED blinking
2. Reading analog sensor values (e.g., temperature sensor LM35)
3. Motion detection using PIR sensor
4. Interfacing an ultrasonic sensor for distance measurement
5. Controlling devices using relay module
6. Displaying sensor data on LCD
7. Introduction to Raspberry Pi and GPIO programming
8. IoT Communication using MQTT (e.g., using Mosquitto broker)
9. Uploading data to ThingSpeak cloud platform
10. Home automation project: Controlling lights with IoT
11. IoT-based weather monitoring system (temperature & humidity)
12. Mini Project: Design and implementation of a real-life IoT prototype (e.g., Smart Dustbin, Smart Plant Watering System)

Course Code	**23HS300**
Course Title	**Entrepreneurship and Start-ups**
Credits	4 (L:3, T:1, P:0)
Semester	6th Semester
Course Category	HUMANITIES

Course Objective:

1. Acquiring Entrepreneurial spirit and resourcefulness.
2. Familiarization with various uses of human resources for earning dignified means of living.
3. Understanding the concept and process of entrepreneurship - its contribution and role in the growth and development of individuals and the nation.
4. Acquiring entrepreneurial quality, competency, and motivation.
5. Learning the process and skills of creation and management of entrepreneurial venture

Unit 1	Introduction to Entrepreneurship and Start – Ups; Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation; Types of Business Structures, Similarities/differences between entrepreneurs and managers.
Unit 2	Business Ideas and their implementation Discovering ideas and visualizing the business; Activity map; Business Plan
Unit 3	Idea to Start-up Market Analysis – Identifying the target market; Competition evaluation and Strategy Development; Marketing and accounting; Risk analysis
Unit 4	Management Company's Organization Structure; Recruitment and management of talent; Financial organization and management
Unit 5	Management Company's Organization Structure; Recruitment and management of talent; Financial organization and management
Unit 6	Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting strategy

Course Outcome:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

- Understanding the dynamic role of entrepreneurship and small businesses
- Organizing and Managing a Small Business
- Financial Planning and Control
- Forms of Ownership for Small Business
- Strategic Marketing Planning
- New Product or Service D

Text Books

1. The Startup Owner's Manual: The Step-by-Step guide for buildings Company; Steve Blank and Bob Dorf; K & S Ranch
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses; Eric Ries; Penguin UK
3. Demand: Creating What People Love Before They Know They Want It; Adrian J. Slywotzky with Karl Weber; Headline Book Publishing
4. The Innovator's Dilemma: The Revolutionary Book That will change the way you do business; Clayton M. Christensen; Harvard business

Online Resources:

1. https://www.fundable.com/learn/resources/guides/startup
2. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate-structure
3. https://www.finder.com/small-business-finance-tips
4. https://profitbooks.net/funding-option-to-raise-startup-capital-for-your-business/

Course Code	:	**23IM-PR-360**
Course Title	:	**MAJOR PROJECT**
Number of Credits	:	4(L: 0, T:0 , P: 8)
Course Category	:	PROJECT

Objective:
Major Project Work aims at developing innovative skills in the students whereby they apply in Totality the knowledge and skills gained through the course work in the solution of particular Problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

General Guidelines
The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 5 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

Some of the project activities are given below:
- Projects related to designing small electrical equipment / instruments.
- Projects related to increasing productivity in electrical manufacturing areas.
- Projects related to quality assurance.
- Projects connected with repair and maintenance of plant and equipment.
- Projects related to design of PCBs.
- Projects related to design of small oscillators and amplifier circuits.
- Projects related to design, fabrication, testing and application of simple digital circuits and components. Projects related to microprocessor/microcontroller based circuits/ instruments.

NOTE: The project should be preferably undertaken by a group of students depending upon cost and time involved.

LEARNING OUTCOMES
After undergoing the project work, students will be able to:
Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place the learner for project oriented practical training in actual work situation for the Stipulated period with a view to:
- Develop understanding regarding the size and scale of operations and nature of fieldwork in which students are going to play their role after completing the courses of study
- Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical Problems related to the world of work.
- Develop abilities like interpersonal skills, communication skills, positive attitudes and Values etc.

Course Code	:	**23IM-SE-362**
Course Title	:	**SEMINAR**
Number of Credits	:	1(L: 0, T:1 , P: 0)
Course Category	:	SEMINAR

Course Objectives:
To learn, practice, and critique effective scientific seminar skills. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

Detailed course contents
The Seminar Subject is an essential component of the curriculum of Diploma Programme. In current scenario, it is a prime requirement for a student to find out the new area/ field/Topic/Subject of his own branch which has been recently and successfully researched or at the final stage of research or at the final stage of transferring to the bulk production scale from the success of Laboratory scale.

Total 01 hrs of Tutorials / week are to be allotted as a workload for his seminar. The Students will work in a group of at least 04 students.

The students have to finalize a Topic for their group of 04 students. Out of 01 hrs Tutorial/week, they have to survey and study for the Topic / Subject from Library / Internet / Research Institute / Association and they have to discuss about the survey and study of their Topic / Subject with the pre-decided Internal Guide of that particular group or batch 01 hrs/week

All the groups have to prepare a seminar report covering their literature survey on any of following areas:
- Description of processes,
- Construction of equipment,
- New Technologies
- Case study,
- Modifications
- Innovations
- New Designs
- New products
- New processes,
- Problems & solutions

Power point slide, figures, Sketches etc. should be prepared and presented before audience. Hard copies/ samples/models should be submitted at the end of the semester / Term to their guide.

The Student will be evaluated from their seminar work, report and Oral/viva Examination by ONE External Examiner and ONE Internal Examiner. The students have to present their seminar at least for 15 minutes in presence of both the examiners, all the faculty members and all the students of this class. They can use Video Projector to display their Power point slides while presenting their Seminar, if they want.