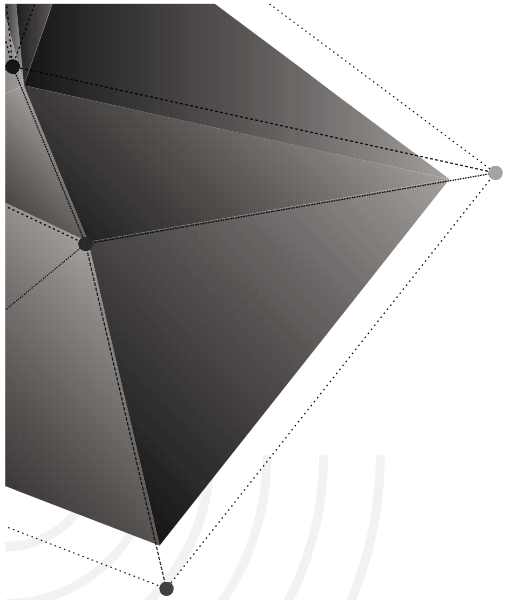
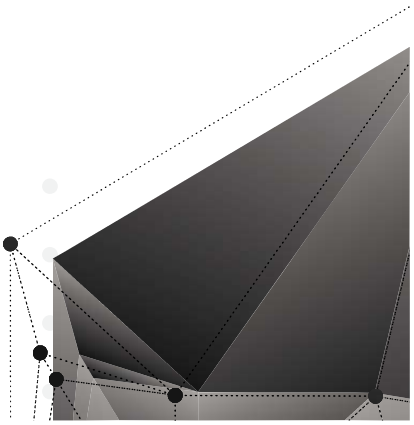


FIFTH SEMESTER

'AUTOMATION
&
ROBOTICS'



MICRO CONTROLLER & EMBEDDED SYSTEM

Course Code:	465001
Course Title	Micro Controller & Embedded System
No. of Credits	10 (TH:6,T:0,P:8)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Explain Architecture of 8051 Microcontroller.
2. Understand and apply the programming techniques.
3. Understand the block diagram and control word (SFR) formats for peripheral devices, timer,
4. Selection of register bank, interrupt handle and serial communication.
5. Understand how to interface with RS232C.
6. Understand various application of 8051 Microcontroller
7. Understand Arduino Board.
8. Understand the concept of embedded system
9. Understand various application of Arduino and implement control circuit using different sensors with Arduino.

COURSE CONTENTS

Unit - I : Introduction of Microcontroller (8051)

1.1 Introduction of Microprocessors and Microcontrollers

1.2 8051 -Pin diagram, Architecture, Internal & external memory organization.

1.3 Port structure.

1.4 8051 SFR-

- Timer operation TCON, TMOD
- Serial communication SCON, SBUF
- Power Handling (PCON)
- Interrupt Handling (IE, IP)
- Program Status word (PSW)

1.5 8051 instruction set

- addressing modes
- conditional instructions
- I/O Programming
- Arithmetic logic instructions
- single bit instructions

Unit - II : Interfaces

2.1 MCS51 and external Interfaces

2.2 User interface – keyboard, LCD, LED

2.3 Real world interface -ADC, DAC

2.4 Sensors: Temperature sensor, IR Sensor

Unit - III : Arduino

4.1 Introduction to Arduino Mega

4.2 Arduino Mega specifications including power ratings, digital and analog peripherals.

4.3 Difference between the C language and Embedded C language

4.4 Arduino Mega Ports, Pins, Digital and Analog Peripherals

4.5 Sensor Communication with Arduino (Temperature, Distance, proximity sensor)

4.6 Different communication modules available with their real-life application Communication interface (Transmitter- receiver, I2C, Bluetooth)

PRACTICAL OUTCOMES: At the end of the course, the student will be able to:

1. Develop proficiency in programming the 8051 microcontroller/Arduino using arithmetic and logic instructions, such as add, subtract, AND, OR, and NOT.
2. Acquire hands-on experience in programming and interfacing 7-segment displays with the 8051 microcontroller/Arduino using both Assembly and C languages.
3. Gain expertise in generating delays using the timer feature of the 8051 microcontroller/Arduino in both Assembly and C languages.
4. Demonstrate the ability to program interrupts in the 8051 microcontroller/Arduino using Assembly and C languages.
5. Learn how to interface a keypad with the 8051 microcontroller/Arduino and implement the necessary programming using Assembly and C languages.
6. Develop skills in interfacing and controlling a stepper motor with the 8051 microcontroller/Arduino using both Assembly and C languages.

List of Practicals: -

Experiment Using 8051

1. Programming with Arithmetic & logic instructions (Add, Subtract, AND, OR NOT) in 8051 [Assembly]
2. Programming using Ports (7 Segment display) [Assembly and C]
3. Delay generation using Timer [Assembly and C]
4. Programming Interrupts [Assembly and C]

5. Interfacing with Keypad [Assembly and C]
6. Interfacing with stepper motor. [Assembly and C]

Experiment Using Arduino

7. Built-in LED state control by push button sketch implementation
8. Built-in LED blinking by toggling states based on binary operation
9. Built-in LED state control by user interface through serial port
10. Controlling multiple LEDs with a loop and an array
11. Use a potentiometer to control the blinking of an LED
12. Uses an analog output (PWM pin) to fade an LED.
13. Servo Motor Control using PWM
14. Temperature sensor interfacing and sending its reading over serial port
15. Arduino based water level controller
16. Arduino and sensor based mini projects

References/Suggested Learning Resources:

1. The 8051 Micro Controller and Embedded Systems Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D. Kinely PHI Pearson Education, 5th Indian reprint
2. Microprocessor and Microcontrollers Krishna Kant Eastern Company Edition, Prentice Hall of India, New Delhi
3. Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051 Soumitra Kumar Mandal McGraw Hill Edu,
4. Arduino Projects for Dummies (For Dummies Series) Kennedy George; Davis Bernard; Prasanna SRM Wiley.
5. Make: Getting Started with Arduino - The Open-Source Electronics Prototyping Platform Massimo Banzi and Michael Shiloh Shroff/Maker Media.
6. Programming with 'C' Schaum's Series
7. 'C' Programming E. Balaguruswami

Suggested Software/Learning Websites:

1. https://www.arduino.cc/reference/en/
2. https://learn.adafruit.com/category/learn-arduino

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COMPUTER INTEGRATED MANUFACTURING (CIM)

Course Code:	455006
Course Title	Computer Integrated Manufacturing (CIM)
No. of Credits	10 (TH:6,T:0,P:8)

COURSE OUTCOMES :- At the end of the course, the student will be able to:

1. Understand the Concept of Computer Integrated Manufacturing
2. Understand the principle of Computer Aided Design
3. To know about Computer Aided Manufacturing
4. To learn about Computer aided production scheduling; computer aided inspection planning
5. Understand the Integrating NC machines, robots, AGVs, and other NC equipment.

COURSE CONTENTS

Unit-1:Introduction to Computer Intigrated Manufacturing

- Concept of Computer Integrated Manufacturing (CIM);
- Basic components of CIM;
- Future automated factory; social and economic factors.

Unit : 2 - Computer Aided Design (Theoretical Aspects)

- Computer Aided Design (CAD): Hardware and Software requirement;
- Product modelling, automatic drafting; engineering analysis;
- FEM design review and evaluation;
- Group Technology Centre.

Unit : 3- Computer Aided Manufacturing

- Computer Aided Manufacturing (CAM);
- Overview of Computer assisted NC part programming;
- Overview of Computer assisted robot programming; computer aided process planning (CAPP);
- Overview of Computer aided material requirements planning (MRP).
- Overview of Automated Guided Vehicle (AGV) and its applications in manufacturing.

PRACTICAL OUTCOMES : Students will be able to-

1. write a CNC lathe program using G-code to machine a simple cylindrical part, gain hands-on experience in selecting appropriate tooling and work holding methods, to install, align, and set up tools and workpieces correctly.
2. Develop the ability to create a VMC program for milling operations, including contouring and pocketing, define toolpaths and cutting strategies, organize tooling stations on a VMC, manage tool offsets, and handle tool changes and tool length compensation.
3. Acquire the skill to write an NC grinder program for surface grinding, considering grinding wheel selection, feed rates, and depth of cut, setting up a grinding wheel and dresser on an NC grinder, proper alignment and dressing for accurate grinding.
4. Understand the concept of Computer Integrated Manufacturing by designing a scenario where CNC lathe, VMC, and NC grinder work together.

List of Practical:

1. Create a CNC lathe program to machine a simple cylindrical part with turning and facing operations.
2. Set up tooling and work holding on a CNC lathe for the part created in Exercise 1, ensuring proper tool selection and alignment.
3. Develop a VMC program to machine a rectangular pocket using contouring and pocketing operations.
4. Set up tool holders and tooling stations on a VMC for the part created in Exercise 3, considering tool length offsets and tool change sequence.
5. Create an NC grinder program to grind a surface on a workpiece using appropriate grinding parameters.
6. Set up the grinding wheel and dresser on an NC grinder for the part created in Exercise 5, ensuring proper alignment and dressing.
7. Develop a CIM system scenario concept where the CNC lathe, VMC, and NC grinder work in coordination to produce a complex assembly involving parts manufactured on each machine. Include data exchange, process planning, and scheduling.

REFERENCE BOOKS:

- CAD, CAM, CIM - P. Radhakrishnan and S. Subramanyan, New Age International Publishers.
- Computer Integrated Manufacturing - Paul G. Rankey, Prentice Hall.
- Robotics Technology and Flexible Automation – S. R. Deb, Tata McGraw Hill.

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'Elective 1-1'
IOT & INTEGRATED AUTOMATION

Course Code:	465002
Course Title	IOT & Integrated Automation
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: After the completion of this course, the students will be able to:

1. Understand the concept and characteristics of Internet of Things (IoT) and its applications in various domains.
2. Familiarize with IoT protocols, communication models, APIs, enabling technologies and communication protocols.
3. Gain knowledge of domain-specific IoT implementations.
4. Acquire practical knowledge of IoT physical devices and endpoints.
5. Understand the concept of Totally Integrated Automation (TIA) and its architecture, components & programmable automation controllers (PAC).
6. Comprehend the basics of Supervisory Control and Data Acquisition (SCADA) systems and interfacing SCADA with PLCs, drives and other field devices.

COURSE CONTENTS

Unit - I : Introduction To Internet of Things

1.1 Definition and characteristics of IoT

1.2 IoT Protocols

1.3 Logical Design of IoT

1.4 IoT functional blocks

1.5 IoT communication Models

1.6 IoT enabling Technologies

Unit - II : Domain Specific IoT

2.1 Home automation- Smart lighting, smart appliances, Intrusion detection, smoke detectors

2.2 Cities- Smart Parking, Smart lighting, Smart Roads, Structural Health Monitoring, Surveillance

2.3 Environment- Weather monitoring, air pollution monitoring, noise pollution monitoring, forest fire detection, river flood's detection

2.4 Energy- Smart grids, renewable energy systems

2.5 Retail- Inventory management, smart payments, smart vending machines

2.6 Logistics- Route generation & scheduling, Fleet tracking, Shipment monitoring, Remote vehicle diagnostics

2.7 Agriculture- Smart Irrigation, Green house control; Industry- Machine diagnosis and prognosis, indoor air Quality monitoring

2.8 Health and Life Style- Health and fitness monitoring, Wearable electronics

Unit - III : IoT Physical Devices and Endpoints

3.1 Basic Building blocks of an IoT Device

3.2 Raspberry Pi, About the Board, Raspberry Pi Interfaces, Other IoT devices.

Unit - IV : Totally Integrated Automation (TIA)

4.1 Need for TIA

4.2 TIA Architecture

4.3 Components of TIA systems

Unit- V: Supervisory Control & Data Acquisition (SCADA)

5.1 Overview

5.2 Developer and runtime packages

5.3 Architecture, Tools, Tags, Graphics

5.4 Alarm logging &Tag logging

5.5 Trends, History, Report generation for SCADA application.

Unit- VI : Communication Protocols of SCADA

6.1 Proprietary and open Protocols

6.2 OLE (Object Linking and Embedding)/OPC (Open Platform Communications) & DDE (Dynamic Data Exchange)

6.3 Server/Client Configuration

6.4 Interfacing of SCADA with PLC, Drive & other field device.

Text Books

1. Internet of Things – A Hands on Approach, By Arshdeep Bahga and Vijay Madisetti Universities Press
2. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India
3. David Bailey, Edwin Wright, —Practical SCADA for industry, Newnes, Burlington, 2003.
4. Gordon Clarke, Deon Reynders, Edwin Wright,-Practical Modern SCADA Protocols: DNP3, 60870.5 and Related systems‖, Newnes Publishing, 2004

References :

1. The Internet of Things – Key Applications and Protocols, Wiley Publication, Olivier Hersent, David Boswarthick, Omar Elloumi. ISBN: 9788126557653
2. The Internet of Things, Pearson, By Michael Miller ISBN: 97893325524563.
3. http://www.cisco.com/c/dam/en_us/solutions/trends/iot/introduction_to_IoT_november.pdf4.
4. https://www.bbvaopenmind.com/en/iot-implementation-and-challenges/ 5.
5. https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-staff-reportnovember-2013-workshop- entitled-internet-things-privacy/150127iotrpt.pd

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'Elective 1-2'
INDUSTRIAL AUTOMATION

Course Code:	465003
Course Title	Industrial Automation
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: At the end of the course, the student will be able to:

1. Understand the overview of industrial automation, data acquisition, and the architecture of industrial automation systems.
2. Comprehend the characteristics of measurement systems and the functioning of data acquisition systems.
3. Gain knowledge of control generation, including automatic control, P-I-D control, and feed-forward control ratio control.
4. Learn about branching operations based on conditional expressions in control systems.
5. Acquire practical knowledge of sequential control and Programmable Logic Controllers (PLC), including ladder diagram programming using AND, OR, and EX-OR logics.
6. Familiarize with various industrial control applications, such as hydraulic control systems, pneumatic control systems, energy savings with variable speed drives, and the basics of CNC machines.

COURSE CONTENTS

Unit - I

1.1 Industrial automation overview and data acquisition

1.2 Architecture of Industrial Automation Systems.

1.3 Systems Characteristics

1.4 Features of Data Acquisition Systems

Unit - II

2.1 Control Generation

2.2 Introduction to Automatic Control

2.3 P-I-D Control (Basic Overview Only)

2.4 The branching operations based on conditions expression

Unit - III

3.1 Sequential control and PLC

3.2 Introduction to Sequence Control, PLC, RLL (Relay ladder logic)

3.3 PLC Hardware Environment

3.4 Ladder Diagram Programming (AND, OR, EX-OR Logics)

Unit - IV

4.1 Industrial control application

4.2 Hydraulic Control Systems

4.3 Pneumatic Control Systems

4.4 Energy Savings with Variable Speed Drives

4.5 Introduction to CNC Machines

References /Suggested Learning Resources:

1. Industrial Instrumentation, Control and Automation S. Mukhopadhyay, S. Sen and A. K. Deb Jaico Publishing House, 2013 ISBN: 978-8184954098
2. Electric Motor Drives, Modelling, Analysis and Control R. Krishnan Prentice Hall India, 2002 ISBN: 978-0130910141

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‘Elective 2-1’
POWER ELECTRONICS

Course Code:	465004
Course Title	Power Electronics
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: After undergoing the subject, the students will be able to:

1. Select power electronic devices for specific applications.
2. Maintain the performance of Thyristors.
3. Troubleshoot turn-off circuits of Thyristors.
4. Demonstrate knowledge of different chopper circuits, operation of cycloconverters, and inverters.
5. Implement speed control of different motors using power electronic devices.

COURSE CONTENTS

Unit-I: Power Semi Conductor Devices & Controlled Rectifier

1.1 Classification of Thyristor family.

1.2 Basic working principle of SCR, GTO, DIAC & TRIAC.

Unit II - SCR Protection & Commutating Circuits

2.1 Need of protection: Over voltage & over current protection.

2.2 Snubber circuit, freewheeling diode, Thermistor, heat sink

2.3 Turn off (commutation) method and brief introduction of its various types-Natural commutation, Forced commutation.

Unit III - Choppers

3.1 Function and working of choppers.

3.2 Types of chopper circuits.

Unit IV - Inverters and Cycloconverter

4.1 Working principle of inverter.

4.2 Classification of inverters-

- 4.2.1 1-Phase and 3-phase inverters.
- 4.2.2 Line commutated and forced commutated inverters.
- 4.2.3 Series, Parallel and bridge inverter.

4.3 Operating principle of cycloconverter.

4.4 Types of cyclo-converters:

- 4.4.1 Single phase to single phase cycloconverter (center tap)
- 4.4.2 Single phase to single phase cycloconverter (bridge type)

Unit- V: Industrial Applications of Power Electronic Devices

5.1 Speed control of D.C. Motor using armature voltage control.

5.2 Speed control of D.C. Motor using SCR chopper circuit.

References /Suggested Learning Resources

1. Power Electronics Rashid, Muhammad H. PHI Learning, and New Delhi latest edition
2. Power Electronics Gupta, B. R., Singhal V. S.K. Kataria and sons, New Delhi

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'Program Elective 1-2'
INDUSTRIAL ELECTRONICS

Course Code:	465005
Course Title	Industrial Electronics
No. of Credits	5 (TH:5,T:0,P:0)

COURSE OUTCOMES: After undergoing the subject, the students will be able to:

1. Select suitable diodes for specific applications.
2. Design various circuits using operational amplifiers (OP-AMP).
3. Create timer circuits utilizing the 555 Timer.
4. Explain different chopper circuits, the operation of cycloconverters, and inverters.
5. Demonstrate speed control of different motors using power electronic devices.

COURSE CONTENTS

Unit- I: Basic Semiconductor Devices for Industrial Electronics

1.1 Working & characteristics of Zener diode, photo diode, LDR

1.2 Working & characteristics of SCR, IGBT, GTO & TRIAC

1.3 Linear IC 741, IC 555, positive & negative voltage regulator

Unit- II : Introduction & Applications of Operational Amplifiers

2.1 Block diagram of general operational amplifier

2.2 Ideal & practical performance characteristics of Op-Amp 741IC

2.3 Phase Shift Circuits

2.4 Voltage Follower Circuits

2.5 Adder, Subtractor Circuits

2.6 Instrumentation amplifier

2.7 Integrator, Differentiator Circuits

2.8 Logarithmic amplifier

Unit- III : Introduction & Applications of Timer IC 555

3.1 Block diagram of IC 555

3.2 Pin diagram and description of IC 555 pins.

3.3 IC 555 as Bistable Multivibrator.

3.4 IC 555 as Monostable Multivibrator (Electronic timer)

3.5 IC 555 as Astable Multivibrator.

Unit IV - Choppers, Inverters and Cycloconverter

4.1 Function and working of choppers

4.2 Types of chopper circuits

4.3 Working principle of inverter

4.4 Classification of inverter

4.5 Operating principle of cycloconverter

4.6 Classification of cycloconverters

References /Suggested Learning Resources:

1. Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007
2. Linear Integrated Circuits, D. Roy Choudhry, Shail Jain New Age International Pvt. Ltd
3. System design using Integrated Circuits B. S. Sonde New Age Pub, 2nd Edition, 2001
4. Analysis and Design of Ana- log Integrated Circuits Gray and Meyer Wiley International, 2005.
5. OP-AMP and Linear Ics Ramakant A. Gayakwad Prentice Hall/Pearson Education, 4th Edition, 20016 Power Electronics 6. Rashid, Muhammad H. PHI Learning, and New Delhi latest edition
7. Power Electronics Gupta, B. R., Singhal V.S.K. Kataria and sons, New Delhi
8. Power Electronics and Industrial Applications, CBS, H.C. Rai.

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'Open Elective 1-1'
MOBILE ROBOTS

Course Code:	465006
Course Title	Mobile Robots
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES : Upon completing this course, students will be able to:

1. Understand the fundamental concepts and principles of mobile robotics.
2. Analyze and design the kinematics and dynamics of mobile robots.
3. Implement localization and mapping algorithms for mobile robots.
4. Develop perception systems using various sensors for mobile robots.
5. Apply motion planning techniques for path planning and obstacle avoidance.
6. Gain knowledge of swarm robotics and its applications.

COURSE CONTENTS

Unit - 1 : Introduction to Mobile Robotics

1.1 Definition and Scope of Mobile Robotics
1.2 Applications of Mobile Robots
1.3 Components and Architecture of Mobile Robots
1.4 Challenges and Limitations in Mobile Robotics
1.5 Sensors and Actuators for Mobile Robots
1.6 Introduction to Robot Navigation

Unit - 2 : Robot Kinematics & Dynamics (Elementary Idea Only)

2.1 Pose Representation and Transformation
2.2 Forward and Inverse Kinematics
2.3 Mobile Robot Dynamics
2.4 Trajectory Planning and Control

Unit - 3 : Localization and Mapping

3.1 Introduction to Localization
3.2 Introduction to Localization Techniques (Odometry, Kalman Filter, Particle Filter)
3.3 Simultaneous Localization and Mapping (SLAM)

Unit - 4 : Perception for Mobile Robots

4.1 Introduction to various Perception methods used for mobile robots
4.2 Object Detection and Recognition

Unit - 5 : Motion Planning & Obstacle Avoidance

5.1 Path Planning Algorithms
5.2 Potential Fields Method
5.3 Collision Avoidance Techniques

Suggested Books :

1. "Introduction to Autonomous Mobile Robots" by Roland Siegwart, Illah R. Nourbakhsh, and Davide Scaramuzza.
2. "Probabilistic Robotics" by Sebastian Thrun, Wolfram Burgard, and Dieter Fox.
3. "Robotics, Vision and Control: Fundamental Algorithms in MATLAB" by Peter Corke.
4. "Mobile Robotics: Mathematics, Models, and Methods" by Alonzo Kelly and Kevin M. Lynch.
5. "Principles of Robot Motion: Theory, Algorithms, and Implementations" by Howie Choset et al.
6. "Swarm Robotics: A Formal Approach" by Elhadi Shakshuki.

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'Elective 2-1'
TOTAL QUALITY MANAGEMENT

Course Code:	455005
Course Title	Total Quality Management
No. of Credits	4 (TH:4,T:0,P:0)

COURSE OUTCOMES : After completion of this course the student will be able to:

1. Develop an understanding on quality management philosophies and frameworks
2. Develop in-depth knowledge on various tools and techniques of quality management
3. Learn the applications of quality tools and techniques in both manufacturing and service industry
4. Develop analytical skills for investigating and analyzing quality management issues in the industry and suggest implement able solutions to those.
5. Emerging concepts for quality and Taguchi optimization technique for off-line

COURSE CONTENTS

Unit - I : Introduction :

Definition of quality, dimensions of quality, quality planning, quality costs, basic concepts of total quality management, historical review, principles of TQM, Role of senior management, quality statements.

Unit - II : Total Quality Management Principles

Customer satisfaction – customer perception of quality, customer complaints, service quality, customer retention, employee involvement – motivation, empowerment, teams, recognition and reward, performance appraisal, benefits, continuous process improvement – Juran trilogy, PDSA cycle, 5s, kaizen.

Unit - III : Total Quality Management Tools

Bench marking – reasons to benchmark, bench marking process, Basic idea of Quality Function Deployment (QFD).

Unit - IV : Quality Systems

Quality Auditing - Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Requirements and Benefits.

Unit - V : Statistical Process Control (SPC)

The seven tools of quality, overview of central tendency and dispersion, population and sample, process capability, concept of six sigma.

Text & Reference Books:

1. Total Quality Management, M.P. Poonia & S.C. Sharma, Khanna Publishing House, 2018.
2. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
3. Quality Control and Applications by Housen & Ghose
4. Industrial Engineering Management by O.P. Khanna.

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SUMMER INTERNSHIP-II

Course Code:	AS501
Course Title	Summer Internship - II
No. of Credits	3 (TH:0,T:0,P:0)

Summer Internship provides an invaluable opportunity for students pursuing their Diploma in Engineering to gain real-world experience and exposure to various industrial production units and commercial activities related to their field of study. This program aims to bridge the gap between theoretical knowledge and practical application, equipping students with the necessary skills and expertise to thrive in the branch related industry.

At the end of the **Fourth semester,** students will undertake a minimum **6-week** Summer Internship, scheduled during the semester break following the Fourth Semester examinations. The respective Heads of Departments (HoDs) and experienced faculty members will guide and assist students in securing suitable training opportunities that align with their specialization. Each student will have a personalized training schedule developed in collaboration with the training providers, ensuring a comprehensive and enriching learning experience.

Before starting their training, students will receive a comprehensive briefing about the organizational setup, product range, manufacturing processes, and significant machinery and materials used in the training organization. This preliminary understanding will enhance their engagement and productivity during the internship.

To ensure a fruitful learning experience, faculty members will supervise students during their training in the industry or field organization. Each teacher will mentor a small group of 4-5 students, providing personalized attention and guidance. Students will be encouraged to maintain daily reports in their diaries, which will assist them in composing their final training report and presentation.

The evaluation process for the Summer Internship will include both internal and external assessments, as per the study and evaluation scheme of the **Fifth Semester.** During the viva-voce/presentation examination, students' understanding of materials, industrial processes, practices in the industry, and problem-solving abilities will be assessed. The evaluation will also focus on their application of knowledge and skills in real-life situations.

The components of evaluation will comprise:

(a) Punctuality and regularity: 15%

(b) Initiative in learning new things: 15%

(c) Relationship with peers and colleagues: 10%

(d) Summer Internship report: 25%

(e) Viva-Voce: 35%

We believe that this Summer Internship program will be a transformative experience for our students, empowering them to excel in their future careers and make meaningful contributions to the Engineering industry. The collaborative efforts of our experienced faculty members and industry partners will ensure that students gain valuable insights and practical skills during this immersive learning journey.

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MAJOR PROJECT-I

Course Code:	AS502
Course Title	Major Project - I
No. of Credits	1 (TH:0,T:0,P:2)

The evaluation of Major Project-I will be conducted to assess students' understanding, application, and presentation of their chosen project topic. The following evaluation criteria will be used to measure their performance:

1. **Project Identification (10%):**
   - Clarity and relevance of the chosen project topic.
   - Demonstration of understanding of the industry or community needs addressed by the project.
   - Adequate justification for selecting the particular project topic.

2. **Project Proposal (10%):**
   - Comprehensive description of project objectives and scope.
   - Logical and well-structured methodology for project execution.
   - Feasibility of the proposed project, considering available resources.

3. **Literature Review (10%):**
   - Thoroughness of the research conducted in relevant academic and professional sources.
   - Critical analysis of existing literature, identifying gaps and potential contributions of the project.

4. **Feasibility Study (10%):**
    - Evaluation of the project's practicality and viability.
    - Assessment of potential risks and proposed mitigation strategies.

5. **Project Planning (20%):**
    - Detailed project plan, including timeline, milestones, and resource allocation.
    - Realistic budgeting and cost management strategies.

6. **Proposal Presentation (30%):**
    - Clarity and effectiveness of communication during the presentation.
    - Ability to address questions and defend the project proposal confidently.
    - Professionalism and engagement with the panel and audience.

7. **Overall Impression (10%):**
    - Demonstrated commitment and effort throughout the project.
    - Creativity and innovation in problem-solving.
    - Adherence to project management principles and best practices.

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