Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

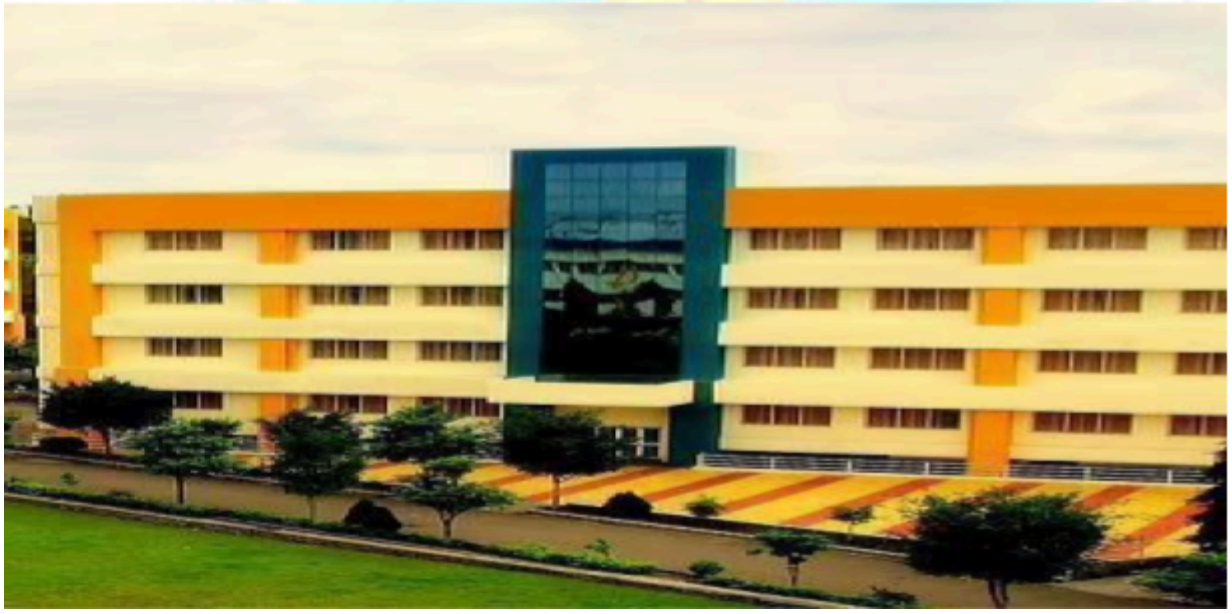
(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)

Curriculum Structure and Syllabus

of

Multi-Disciplinary Minors (MDM) in Embedded Systems Design

(Regulations 2023)



Effective from Academic Year 2024-25

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

"We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institute's social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS)."

Course Approval Summary

Board of Studies - Department of Electronics and Telecommunication

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Sensors and Transducers Technology	BET23MD01	8	
2	Microprocessors and Microcontrollers	BET24MD01	10	
3	Advanced Microcontrollers (Theory)	BET25MD01	12	
4	Advanced Microcontrollers Lab	BET25MD02	14	
5	Embedded System Applications	BET26MD01	16	
6	Capstone Project	BET27MD01 / BET28MD01	18	

Approved by Academic Council:

Chairman, Academic Council
Pimpri Chinchwad College of Engineering

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Preface

The Department of Electronics and Telecommunication Engineering at PCCOE is pleased to offer students a Multidisciplinary Minor (MDM) in Embedded System Design from the Mechanical and Civil Engineering Departments. This comprehensive program aims to equip students with the knowledge and skills necessary for designing and implementing embedded systems, which are ubiquitous in modern engineering applications.

Objectives:

1. To introduce students to the fundamental concepts of sensors, actuators, and transducers essential for automotive applications and smart city requirements.
2. To provide an in-depth understanding of microprocessors and microcontrollers, their architecture, programming, and their role in embedded system design.
3. To develop proficiency in interfacing various peripherals, sensors, and actuators with microcontrollers, enabling students to build complex embedded systems.
4. To expose students to real-world applications of embedded systems in civil and mechanical engineering domains, fostering practical knowledge and problem-solving skills.

Outcomes:

Upon successful completion of the MDM in Embedded System Design, students will be equipped with the following outcomes:

1. Ability to select and integrate appropriate sensors, actuators, and transducers for specific applications.
2. Proficiency in programming and configuring microprocessors and microcontrollers for embedded system development.
3. Expertise in interfacing and controlling various peripherals, sensors, and actuators through microcontroller-based systems.
4. Understanding of embedded system design considerations, best practices, and real-world applications in civil and mechanical engineering domains.

The MDM in Embedded System Design is offered by the Department of Electronics and Telecommunication Engineering and is specifically designed for students from the Mechanical and Civil Engineering Departments. This interdisciplinary program aims to bridge the gap between traditional engineering disciplines and the rapidly evolving field of embedded systems, enabling students to develop innovative solutions for automotive, smart city, and various other applications.

Curriculum Structure MDM
in
Embedded Systems Design

CURRICULUM STRUCTURE

MDM in Embedded Systems Design (2023 Course)

(With effect from Academic Year 2024-25)

Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
		L	P	T	Total	L	P	T	CIE		SA	TW	PR	OR	Total
									FA 1	FA 2					
Semester III															
BET23MD01	Sensors and Transducers Technology	2	-	-	2	2	-	-	10	10	30	-	-	-	50
Semester IV															
BET24MD01	Microprocessors and Microcontrollers	2	-	-	2	2	-	-	10	10	30	-	-	-	50
Semester V															
BET25MD01	Advanced Microcontrollers and Interfacing Techniques	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BET25MD02	Advanced Microcontrollers and Interfacing Techniques Lab	-	1	-	1	-	2	-	-	-	-	50	-	-	50
Semester VI															
BET26MD01	Embedded System Applications	2	-	-	2	2	-	-	10	10	30	-	-	-	50
Semester VII/VIII															
BET27MD01/ BET28MD01	Capstone Project	-	4	-	4	-	8	-	-	-	-	100	-	50	150
Total		9	5		14	9	10		50	50	150	150		50	450

L-Lecture, **P**-Practical, **T**-Tutorial, **FA**–Formative Assessment, **SA**-Summative Assessment, **TW**-Term Work, **OR**-Oral, **PR**-Practical

Course Syllabus

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)					**Semester: III**	
Course :	Sensors and Transducers Technology					**Code :**	BET23MD01
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**			
	Lecture	**Practical**	**Tutorial**	**FA**		**SA**	**Total**
				FA1	**FA2**		
02	**02**	**-**	**-**	**10**	**10**	**30**	**50**

Prior knowledge of
Basic Electrical Engineering
Basic Electronics Engineering
is essential.

Course Objectives:
This course aims at enabling students,
1. To identify different methods of measurement and recognise errors in measurements.
2. To Provide a thorough understanding of various types of sensors, their working principles, and their characteristics.
3. To Familiarize students with different signal conditioning for measurements.
4. To Understand real-world applications of sensors and transducers in engineering domains

Course Outcomes:
After learning the course, the students should be able to:
1. Identify different methods of measurement and errors in measurements.
2. Elaborate the working principle of various sensors and their characteristics.
3. Illustrate concepts of analog and digital Signal Conditioning in industrial automation systems.
4. Design real-world applications of sensors and transducers in engineering domains.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Introduction to Electronics Measurement and Instrumentation:** Definition of sensors and transducers, Characteristics of sensors, Classification based on operating principles, Transduction mechanisms: resistive, capacitive, inductive, piezoelectric, and optical. Introduction to calibration and error analysis	06

2	**Sensors Technologies-I** Resistive sensors: potentiometers, Thermostors, Strain Sensors, types of strain Gauges and applications, Load cells, Capacitive sensors: capacitive transducers, Capacitive proximity sensors, accelerometers, Inductive sensors: inductive proximity sensors, LVDT, Piezoelectric sensors: force sensors, vibration sensors, and acoustic sensors	08
3	**Sensors Technologies-II and Applications** Optical sensors: photodiodes, phototransistors, fiber optic sensors, Temperature sensors: Thermocouples, RTDs, Thermistors - principles of operation and applications, Smart sensors: MEMS (Microelectromechanical Systems) sensors, Applications - Structural health monitoring, environmental sensing, machine condition monitoring	08
4	**Signal Conditioning and Interfacing Techniques:** Signal conditioning – Study of Amplification, Filtering techniques, D/A Conversion and A/D Conversion, Data Acquisition System (DAS), Interfacing sensors with microcontrollers/prototype development boards, Case study: System design for sensor application	08
	Total	30

Text Books:

1. D.V.S. Murty, “Transducers and Instrumentation”, Prentice Hall India.
2. Helfrick Albert D. and Cooper W. D., "Modern Electronic Instrumentation and Measurement Techniques", Prentice Hall India.
3. Sensor & transducers, D. Patranabis, PHI 2nd edition 2013
4. S. Gupta, J.P. Gupta / PC interfacing for Data Acquisition & Process Control, 2nd ED / Instrument Society of America, 1994
5. Kalsi H. S. "Electronic Instrumentation", Tata McGraw-Hill Education.
6. Alan S Morris, Measurement and Instrumentation: Theory and Application, Elsevier, 3rd Edition, 2019

Reference Books:

1. Sabrie Soloman, Sensors handbook, 2nd Edition, McGraw Hill
2. Bell David A. "Electronic Instrumentation and Measurements", PHI / Pearson Education.
3. Thomas A. Hughes, Measurement and Control Basics, 4th Edition, ISA, 2016
4. Curtis D. Johnson, “Process Control Instrumentation Technology”, Prentice Hall India

e-sources:

1. Course: Industrial Instrumentation, Prof. Alok Barua, IIT Guwahati,
   Link: https://nptel.ac.in/courses/117/102/117102049/

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)					**Semester: IV**	
Course :	Microprocessors and Microcontrollers					**Code :**	BET24MD01
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**			
	Lecture	**Practical**	**Tutorial**	**FA**		**SA**	**Total**
				FA1	**FA2**		
02	**02**	**-**	**-**	**10**	**10**	**30**	**50**

Prior knowledge of
Digital Electronics
is essential.

Course Objectives:

This course aims at enabling students,

1. To understand the architecture and features of microprocessors and microcontrollers.
2. To understand the importance of microcontrollers and its tools for developing real-life applications.
3. To interface of real-world peripheral devices with microcontrollers.

Course Outcomes:

After learning the course, the students should be able to:

1. Understand the differences between microprocessors and microcontrollers.
2. Analyze the architecture and features of 8051 microcontrollers.
3. Develop interfacing models according to applications using microcontrollers.
4. Apply the programming concepts to the Arduino board.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**Introduction to Microprocessors and Microcontrollers:** 8086 microprocessors: Salient Features, Pin Description, Architecture of 8086: Functional Block Diagram, Microprocessor vs Microcontroller, Criteria for Choosing Microcontroller, Programming environment for microcontrollers.	06
2	Architecture of 8051, Features and pin diagram of 8051, Memory organization, Addressing Modes, Port structure, Interrupt structure, timers and its modes, serial communication and its modes	08

3	**Peripheral Interfacing with Microcontrollers:** LED interfacing to 8051, Interfacing of LCD, Keypad, Motors, IR and Switches, Both side serial communication (All programs in embedded C), Introduction to AVR Family, Comparison of 8051 and AVR microcontrollers.	08
4	**Introduction to Arduino:** Introduction of Arduino Boards, Features of Arduino UNO Board, Arduino Shields, Introduction to the Arduino IDE, installing the Arduino IDE and uploading a sketch to your Arduino, Introduction to Arduino programming, Understand the basic parts of an Arduino sketch, custom functions, Creating functions, Using variables, constants, and control structures: The "if",” while", "For",” Switch" statement.	08
	Total	30

Text Books:

1. Ramesh Gaonkar, ―Microprocessor Architecture, Programming and Applications with the 8085‖, Prentice Hall, 6 th edition,2010.
2. Kenneth J. Ayala, The 8051 Microcontroller, Cengage Learning, 3rd edition,2012.
3. M.A. Mazidi, R.D. McKinlay, J.G. Mazidi, ―The 8051 Microcontroller: A Systems Approach‖, Pearson, 2 nd edition,2012.
4. Mahumad Ali Mazadi, Janice Gillispie Mazadi, Rolin D McKinlay, “The 8051 Microcontroller & Embedded Systems (Using Assembly and C)”, PHI, 2 nd Edition
5. Mahumad Ali Mazadi, Rolin D McKinlay and Danny Causey, “PIC Microcontroller & Embedded System”, Pearson Education, 3rd Edition
6. Arduino-Based Embedded Systems: By Rajesh Singh, Anita Gehlot, Bhupendra Singh, and Sushabhan Choudhury, CRC Press, Taylor & Francis Group, 1st edition 2017.

Reference Books:

1. Ajay Deshmukh, “Microcontrollers Theory and Applications”, TATA McGraw Hill, 4th Edition
2. Peatman, John B, “Design with PIC Microcontroller”, Pearson Education PTE, 1 st Edition
3. Data Sheet of 8086, 8051, PIC 18Fxxxx series, AVR.
4. Exploring Arduino: Tools and Techniques for Engineering Wizardry,by Jeremy Blum ,Wiley Publication, 2013, 1st Edition, ISBN- 13: 978-1118549360,ISBN-10: 1118549368.
5. https ://www.arduino.cc/en/Tutorial/HomePage

e-sources:

1. NPTEL Course ““Microcontroller and Applications”
https://nptel.ac.in/courses/117/104/117104072/
https://nptel.ac.in/courses/108/105/108105102/
2. Udemy Course “AVR microcontrollers: C language, electronic devices” video course link of the Course
https://www.udemy.com/share/103wvE/
3. Udemy Course “Complete AVR Microcontroller Programming Course” video course link of the Course
https://www.udemy.com/share/105Yz8/

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)				**Semester: V**		
Course :	Advanced Microcontrollers and Interfacing Techniques				**Code :**	BET25MD01	
Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**			
	Lecture	**Practical**	**Tutorial**	**FA**		**SA**	**Total**
				FA1	**FA2**		
03	**03**	**-**	**-**	**20**	**20**	**60**	**100**

Prior knowledge of
Microprocessors and microcontrollers
is essential.

Course Objectives:
This course aims at enabling students,
1. To select appropriate PIC microcontrollers for specific applications.
2. To interface peripherals, sensors, actuators, and displays.
3. To familiarize students with advanced communication protocols for networked systems.

Course Outcomes:
After learning the course, the students should be able to:
1. Compare PIC microcontroller families and architectures.
2. Implement low-power features and use development tools.
3. Interface basic peripherals with PIC microcontrollers.
4. Interface advanced peripherals and communication protocols.
5. Interface sensors and develop sensor-based applications.
6. Control actuators and interface displays.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	**PIC Microcontroller Families and Architectures** PIC microcontroller families (PIC18, PIC24, PIC32), Architecture comparison (8-bit, 16-bit, 32-bit), Memory organization and management, Interrupt handling and exception processing	08
2	**Advanced PIC Microcontroller Features and Tools** Low-power and energy-efficient features, Watchdog timers and brown-out detection, In-circuit serial programming (ICSP), Development tools and IDEs	07

3	**PIC Microcontroller Interfacing - Basic Peripherals** GPIO and pin multiplexing, Timers and counters, Analog-to-digital converters (ADC), Digital-to-analog converters (DAC)	07
4	**PIC Microcontroller Interfacing - Advanced Peripherals** Pulse-width modulation (PWM), Capture/Compare/PWM (CCP) modules, Universal Asynchronous Receiver/Transmitter (UART), Inter-Integrated Circuit (I2C) and Serial Peripheral Interface (SPI)	08
5	**Interfacing with Sensors** Temperature sensors (thermocouples, RTDs, thermistors), Pressure sensors (piezoresistive, capacitive), Strain gauges and load cells, Accelerometers and gyroscopes	08
6	**Interfacing with Actuators and Displays** Actuator control (DC motors, stepper motors, servos), Motor driver circuits and H-bridges, Relay and solenoid control, Interfacing with displays (LCD, OLED)	07
	Total	45

Text Books:

1. Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18", Pearson, 2016.
2. Dogan Ibrahim, "Advanced PIC Microcontroller Projects in C: From USB to RTOS with the PIC18F Series", Newnes, 2011.

Reference Books:

1. Milan Verle, "PIC Microcontrollers - Programming in C", mikroElektronika, 2009.
2. Lucio Di Jasio, "Programming 16-Bit PIC Microcontrollers in C: Learning to Fly the PIC 24", Newnes, 2007.
3. Tim Wilmshurst, "Designing Embedded Systems with PIC Microcontrollers: Principles and Applications", Newnes, 2009.

e-sources:

1. NPTEL Swayam, "Microprocessors And Microcontrollers" by Prof. Santanu Chattopadhyay, IIT Kharagpur: https://onlinecourses.nptel.ac.in/noc22_ee12/preview
2. Udemy.com, Let Us PIC: A Datasheet Approach for PIC Microcontroller, https://www.udemy.com/course/let-us-pic/
3. Udemy.com, PIC Microcontroller: Architecture and Embedded C Programming, https://www.udemy.com/course/pic-microcontroller-architecture-and-embedded-c-programming/

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)	**Semester: V**	
Course :	Advanced Microcontrollers and Interfacing Techniques Lab	**Code :**	BET25MD02

Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme**			
	Lecture	**Practical**	**Tutorial**	**Marks**			**Total**
				TW	OR	PR	
01	**-**	**02**	**-**	**50**	**-**	**-**	**50**

Prior knowledge of
Microprocessors and microcontrollers
is essential.

Course Objectives:
This course aims at enabling students,
1. To Familiarize with advanced features and capabilities of PIC microcontrollers.
2. To design and implement embedded systems using PIC microcontrollers.
3. To interface various sensors, actuators, and peripherals with PIC microcontrollers.

Course Outcomes:
After learning the course, the students should be able to:
1 Write efficient and well-structured code in C language for PIC microcontrollers.
2. Design and develop embedded systems using PIC microcontrollers, sensors, and actuators.
3. Interface real-word devices/peripherals with PIC microcontrollers.

Detailed Syllabus (Perform any 8 experiments from below)

Unit	**Description**	**Duration [Hrs]**
I	Blink an LED using PIC microcontroller.	02
2	Read input from a push button and control an LED.	02
3	Display text on an LCD using PIC microcontroller.	02
4	Generate a square wave using PIC microcontroller and observe it on an oscilloscope.	02
5	Measure temperature using an LM35 sensor and display it on an LCD.	02
6	Control the brightness of an LED using PWM.	02
7	Communicate between PIC microcontroller and PC using UART.	02

8	Rotate a stepper motor in both directions.	02
9	Control the speed of a DC motor using PWM.	02
10	Control the angle of a servo motor using PWM.	02

Reference Books:

1. PIC18F4520 Datasheet by Microchip Technology Inc.
2. "PIC Microcontroller and Embedded Systems: Using Assembly and C for PIC18" by Muhammad Ali Mazidi, Rolin D. McKinlay, and Danny Causey, Pearson Education, 2016.
3. "PIC Microcontroller: An Introduction to Software & Hardware Interfacing" by Han-Way Huang, Delmar Cengage Learning, 2004.

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)	**Semester: VI**	
Course :	Embedded System Applications	**Code :**	BET26MD01

Credits	**Teaching Scheme (Hrs./Week)**			**Evaluation Scheme and Marks**			
	Lecture	**Practical**	**Tutorial**	**FA**		**SA**	**Total**
				FA1	**FA2**		
02	**02**	**-**	**-**	**10**	**10**	**30**	**50**

Prior knowledge of
• Sensors and Transducers Technology
• Microprocessors and Microcontrollers
is essential.

Course Objectives:
This course aims at enabling students,
1. To familiarise with embedded systems applications in structural health monitoring and building automation.
2. To understand environmental monitoring and geotechnical instrumentation using embedded systems.
3. To understand industrial process control, automation, and robotics applications of embedded systems.

Course Outcomes:
After learning the course, the students should be able to:
1. Apply embedded systems concepts in structural health monitoring and building automation applications.
2. Design and implement embedded systems for environmental monitoring and geotechnical instrumentation.
3. Understand the role of embedded systems in industrial process control, automation, and robotics.
4. Develop embedded systems for condition monitoring and automotive applications.

Detailed Syllabus:

Unit	**Description**	**Duration [Hrs]**
I	**Structural Health Monitoring and Building Automation** Sensor networks for structural monitoring, Data acquisition and analysis techniques, HVAC control and energy management, Lighting control and occupancy detection	08
2	**Environmental Monitoring and Geotechnical Instrumentation** Air and water quality monitoring, Weather monitoring and forecasting, Slope stability monitoring, Soil moisture and pore water pressure monitoring	07

3	**Embedded Systems in Industrial Process Control and Automation** Industrial automation systems, Embedded systems in robotics control, Sensor integration and data acquisition in robotics, Actuator control and motion planning, Automated guided vehicles (AGVs) and mobile robots	07
4	**Condition Monitoring and Automotive Applications** Vibration analysis and fault detection, Temperature and pressure monitoring, Engine control units (ECUs) and electronic control systems, In-vehicle infotainment and telematics systems	08
	Total	30

Text Books:

1. Jonathan W. Valvano, "Embedded Systems: Introduction to ARM Cortex-M Microcontrollers", CreateSpace Independent Publishing Platform, 2014.
2. Simon Monk, "Programming Arduino: Getting Started with Sketches", McGraw-Hill Education, 2016.
3. Thomas Bräunl, "Embedded Robotics: Mobile Robot Design and Applications with Embedded Systems", Springer, 2008.
4. Denton, Tom. "Automobile Electrical and Electronic Systems." Routledge, 2017.
5. David G. Alciatore and Michael B. Histand, "Introduction to Mechatronics and Measurement Systems", McGraw-Hill Education, 2018.

Reference Books:

1. Lacamera, Daniele. "Embedded Systems Architecture: Explore Architectural Concepts, Pragmatic Design Patterns, and Best Practices to Produce Robust Systems." Packt Publishing, 2018.
2. Balageas, Daniel, Claus-Peter Fritzen, and Alfredo Güemes. "Structural Health Monitoring." ISTE Press - Elsevier, 2006.
3. Eyke, Maurice. "Building Automation Systems: A Practical Guide to Selection and Implementation." Routledge, 2020.
4. Gertz, Emily, and Patrick Di Justo. "Environmental Monitoring with Arduino: Building Simple Devices to Collect Data About the World Around Us." O'Reilly Media, 2012.
5. Dunnicliff, John. "Geotechnical Instrumentation for Monitoring Field Performance." Wiley-Interscience, 1993.
6. Lamb, Frank. "Industrial Automation: Hands-On." McGraw-Hill Education, 2013.
7. Navet, Nicolas, and Francoise Simonot-Lion. "Automotive Embedded Systems Handbook." CRC Press, 2017.

MDM :	Embedded System Design (offered by Electronics and Telecommunication Engg) (Applicable to: Civil , Mech)			**Semester-VII/VIII**			
Course:	Capstone Project			**Code:** BET27MD01/ BET28MD01			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Tutorial**	**Credit**	**Hours**	**TW**	**Oral**		**Total**
-	-	4	8	100	50		150

Prior knowledge of
basics of hardware, software and services required for an IoT application
is essential.

Course Objectives:

1. To test students' knowledge of course implementation.
2. To make students ready for development of an IoT system

Course Outcomes:

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

1. **Apply** Knowledge of IoT for solving real time issues.
2. **Design** a IoT system to solve Societal Issue.
3. **Develop** the project and communicate it to outside world.

Detailed Guidelines:

1. The student should let the course instructor know in advance the intended topic of the project and seminar.
2. The students are encouraged to take projects for developing software solutions and hardware platforms using the concept of course taken under the certification.
3. The project guidelines for evaluation of performance are as follows .

Detailed Syllabus:

Integrated Mini-Project

Sr. No.	**Activity**	**Duration h**
1.	Week 1 &2 : Mini-project guide allotment, finalization of topic and platform, Planning of the work	**8**
2.	Week 3&4: Literature review and specification and Methodology Finalization, Review 1 for finalization of topic and specification.	**8**
3.	Week 5&6 : Simulation of Idea on appropriate software tools and finalization of hardware platform	**8**

4.	Week 7 & 8 : understanding platform implementation and related software flow and execute block level design , Review 2 to understand the progress of the project	**8**
5.	Week 9 & 10: Mini Project Report writing and publication or copyright planning and execution.	**8**
6.	Week 11&12: Demonstration of Project work and Final Review for submission and term work compliances.	**8**
	Total	**48**
Note:The seminar guidelines mentioned in B.Tech (E&TC) structure will be followed for evaluation.		

Annexure

Sr. No.	Course Code	Name of the Course	Semester	Course Credit	Academic Year	Total Marks	Total Hours
1	BET23MD01	Sensors and Transducers Technology	III	2	2023-2024	50	30
2	BET24MD01	Microprocessors and Microcontrollers	IV	2	2024-2025	50	30
3	BET25MD01	Advanced Microcontrollers and Interfacing Techniques	V	3	2025-2026	100	45
4	BET25MD02	Advanced Microcontrollers and Interfacing Techniques Lab	V	1	2025--2026	50	30
5	BET26MD01	Embedded System Applications	VI	2	2026--2027	50	30
6	BET27MD01 / BET28MD01	Capstone Project	VII / VIII	4	2027--2028	150	120

Vision and Mission of the E&TC Department

VISION:

To be recognized as a distinguished department in the field of electronics and telecommunication transforming students into competent technocrats by providing an Ethical, Sustainable and ValueAdded Quality Education.

MISSION:

1. To create competent Electronics and Tele-communication engineers with Knowledge, Skill and Attitude by establishing a conducive learning environment.

2. To nurture technical competency, entrepreneurship skills and promote higher studies through the state-of-art facilities for building successful careers.

3. To facilitate research by engaging in projects of industrial requirement and national importance.

4. To impart Life skills, Ethical and Social values for self-sustainability.