ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2024-25

INDUSTRIAL IoT

SEMESTER IV

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of hours for ESE
				L	T	P		Mid Sem Exam	Continual Assessment	End Sem Examination	Total	
1.	PCC	**24II401T**	Microprocessors & Microcontrollers	3	-	-	3	20	20	60	100	03
2.	PCC	**24II401P**	Microprocessors & Microcontrollers Lab	-	-	2	1	-	25	25	50	-
4.	PCC	**24II402T**	IoT Protocols & Architecture	3	-	-	3	20	20	60	100	03
5.	PCC	**24II402P**	IoT Protocols & Architecture Lab	-	-	2	1	-	25	25	50	-
5.	PCC	**24II403T**	Computer Networks	2	-	-	2	10	10	30	50	1.5
6.	VSC	**24II404P**	Technical Skill Development - I	-	-	4	2	-	50	-	50	-
7.	VEC	**24II405T**	Value Education Course	3			3	20	20	60	100	03
8.	SEC	**24II441P**	Career Development - IV	-	-	2	1	-	50	-	50	-
9.	ELC	**24II406P**	Micro Project II*	-	-	2	1	-	50	-	50	-
10.	MDM	**24II431M**	Multidisciplinary Minor – II	3	-	-	3	20	20	60	100	03
			Total	**14**		**12**	**20**	**90**	**290**	**320**	**700**	

*** Field Project or Community engagement project in the major discipline**

Multidisciplinary Minor – II	
24II431M	Introduction to IoT

		July 2025	**NEP 2.1**	**Applicable for 2025-26**
Chairman - BoS	**Dean – Academics**	**Date of Release**	**Version**	

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
24II401T	Microprocessors & Microcontrollers	3	-	-	3	15	15	70	100

Course Objectives		Course Outcomes
To impart a comprehensive understanding of architecture, programming and peripheral interfacing of Microprocessors & Microcontrollers and their application in embedded systems	1.	2. Explain internal architecture, Memory organization, Instruction set of 8085 microprocessors 3. To develop proficiency in programming using assembly language gain the knowledge of interfacing microprocessors and gain a comprehensive understanding of the basics of 8086 microprocessor and 8087 math co-processor 4. To explain the concept of internal architecture, Memory organization and Instruction set of 8051microcontroller. 5. To develop assembly language program and embedded C program for 8051 microcontrollers 6. To illustrate the Interfacing of 8051 with different peripheral devices.

Unit I **[8 Hrs]**

Basic concepts of microprocessor, definition, microprocessor-based systems, memory, memory map and addresses, the three cycle instruction execution model, 8085 Microprocessor architecture, pin diagram, system bus, registers, flag register, address bus, data bus, Instruction set of 8085, addressing modes, timing diagram, stack and subroutines, interrupts, basic concepts in serial I/O, programming

Unit II **[8 Hrs]**

8085 ALP, Interfacing I/O devices, 8255 Programmable Peripheral Interface, pin diagram and block diagram of 8255, Analog-to-Digital converter and Digital-to-Analog converter, 8086 Microprocessor pin diagram, architecture, addressing modes and 8087 Math coprocessor

Unit III **[9 Hrs]**

8051 microcontroller : Introduction to 8051 microcontroller; Pin diagram, architecture, features & operation, Ports, memory organization, SFR's, Flags, Counters/Timers, Serial ports. Interfacing of external RAM & ROM with 8051. 8051 Interrupt structure, Interrupt vector table with priorities, enabling & disabling of interrupts

Unit IV **[7 Hrs]**

8051 microcontroller & programming: Instruction set of 8051; data transfer, logical, arithmetic & branching instructions, Addressing modes, Assembly language programming examples, Introduction to Embedded C, programming examples

Unit V **[8 Hrs]**

8051 Timers , Serial and interfacing: Counter/Timer programming in various modes. Serial communication, Operating modes, serial port control register, Baud rates. Interfacing keyboard, LED display, ADC & DAC interface, stepper motor interface, Embedded C programming examples

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Microprocessor Architecture, Programming and Applications with the 8085	R. Gaonkar	2014	Prentice Hall
2.	The 8051 Microcontroller: A Systems Approach	M.A. Mazidi, R.D. McKinlay, J.G. Mazidi,	2013	Pearson
3.	Advanced Microprocessor And Peripherals	A K Ray, K M Bhurchandi	2009	McGraw-Hill Education (India)
4.	The AVR Microcontroller and Embedded Systems: Using Assembly and C	M.A. Mazidi, S. Naimi, S. Naimi	2011	Prentice Hall

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
23II402P	Microprocessors & Microcontrollers Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To acquire the basic knowledge of microprocessors and microcontrollers and its assembly language programming. 2. To prepare students to perform the analysis and interfacing of various microprocessors and microcontrollers-based systems.	After studying this course, the students would gain enough knowledge 1. To explain the fundamental concepts and techniques used in microprocessors and microcontrollers 2. To understand and learn the art of the assembly language programming 3. The ability to understand, analyze and design various combinational and sequential circuits. 4. To develop the skills to interface, build and troubleshoot microprocessors and microcontrollers-based systems

All eight experiments to be performed from the list

Expt. No.	Title of the experiment
1	Introduction of 8086 Microprocessor and Its Trainer kit
2	Perform arithmetic operations using Assembly Language Programming in 8086 Microprocessor
3	Perform sorting of 10 numbers using Assembly Language Programming in 8086 Microprocessor
4	To find the sum of a series of 10 numbers using Assembly Language Programming in 8086 Microprocessor
5	Assembly Language Programming in 8051 Microcontroller
6	Assembly Language Programming in 8051 Microcontroller
7	Assembly Language Programming in 8051 Microcontroller
8	Embedded C Programming and interfacing in 8051 Microcontroller
9	Embedded C Programming and interfacing in 8051 Microcontroller
10	Embedded C Programming and interfacing in 8051 Microcontroller

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Microprocessor Architecture, Programming and Applications with the 8085	R. Gaonkar	2014	Prentice Hall
2.	The 8051 Microcontroller: A Systems Approach	M.A. Mazidi, R.D. McKinlay, J.G. Mazidi,	2013	Pearson

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
24II402T	IoT Protocols & Architecture	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
To impart a comprehensive understanding and knowledge of the different IoT communication and connectivity technologies along with the interoperability and network architecture and design of IoT systems	1. Understand the basic principles involved in IoT systems 2. Understand and gain comprehensive understanding of different IoT Connectivity Technologies 3. Understand and gain comprehensive understanding of different IoT Communication Technologies 4. Analyze and gain an in-depth understanding of the issues related to IoT interoperability 5. Analyze and gain comprehensive understanding of IoT Network Architecture and design

Unit I **[08 Hrs]**

Emergence of IoT: Introduction, Evolution of IoT, Definition and characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Levels and Deployment Templates, IoT and M2M, differences between the IoT and M2M, SDN and NFV for IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing Strategies in IoT, IoT, Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Unit II **[09 Hrs]**

IoT Connectivity Technologies: Introduction, IEEE 802.15.4, Zigbee, Wireless HART, RFID, NFC, DASH7, Z-Wave, Weightless, LoRa, NB-IoT, Wi-Fi, Bluetooth.

Unit III **[08 Hrs]**

IoT Communication Technologies: Introduction, Infrastructure Protocols, Discovery Protocols, Data Protocols, Identification Protocols, Device Management, Semantic Protocols.

Unit IV **[07 Hrs]**

IoT Interoperability: Introduction: Taxonomy of interoperability, Standards, Frameworks.

Unit V **[08 Hrs]**

IoT Network Architecture and Design: Drivers behind New Network Architectures, The OneM2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack

Books and References

S.N	Title	Authors	Edition	Publisher
1.	Introduction to IoT	Sudip Misra, Anandrup Mukherjee, Arijit Roy	1st edition	Cambridge University Press
2.	Internet of Things	Jeeva Jose	1st edition	Khana Publishers
3.	Internet of Things– A Hands-on Approach	Arshdeep Bahga, Vijay Madisetti,		Universities Press, 2015.

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24II402P	IoT Protocols & Architecture Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
To acquire the basic knowledge of Arduino boards, various sensors and actuators used in IoT and their programming	1. To understand and learn the art of writing programs and interfacing various sensors and actuators used in IoT with Arduino boards and Node MCU 2. To understand, analyze data generated through sensors and observe the data on Thingspeak platform

Expt. No.	Title of the experiment
1	Introduction to Arduino Boards and writing an Arduino sketch
2	LED interface with Arduino
3	DHT Sensor interface with Node MCU
4	Temperature sensor DS18B20 interface with Node MCU
5	Ultrasonic sensor interface with Node MCU
6	Obstacle detection using Node MCU
7	Stepper motor interface with Node MCU
8	Introduction to Thingspeak and sending and observing data on Thingspeak

Books and References

S.N	Title	Authors	Edition	Publisher
1.	Introduction to IoT	Sudip Misra, Anandrup Mukherjee, Arijit Roy	I	Cambridge University Press
2.	Internet of Things	Jeeva Jose	I	Khanna Publishers
3.	Internet of Things– A Hands-on Approach	Arshdeep Bahga, Vijay Madisetti,	I	Universities Press

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II403T	Computer Networks	2	-	-	2	10	10	30	100

Course Objectives	Course Outcomes
This course is intended to 1. Deliver the fundamentals of computer network 2. Discuss and focuses on network architectures, protocols and applications, techniques for encoding and modulation.	**Students will be able to** 1. Describe the components and infrastructure that form the basis for most computer networks and outline the various real-world networks. 2. Learn and compare the various protocols models along with addressing scheme and discuss the protocols used in network. 3. Classify and illustrate the different techniques for digital data transmissions at physical layer and routing at network layer.

Unit I Introduction to Computer Networking Concepts **[8 Hrs]**

Uses of computer networks, Layered Network Protocol Architectures OSI and TCP/IP Model; Personal, Local, Metropolitan and Wide Area Networks; Telecommunications and Cellular Networks overview. Bus, Star and Ring topologies.
Physical Layer: Basics of communications; Physical media types, Wired and Wireless media including copper cables, optical fiber.

Unit II Data Link Layer, Logical Link Control (LLC) sub-layer **[8 Hrs]**

Data Link Layer, Logical Link Control (LLC): Framing; Error control including Bit-parity, CRC and Hamming Codes; Reliable transmission and Automatic Repeat Request (ARQ) protocols including Stop-and-Wait, Go-back-N, Selective Repeat. Example protocols such as HDLC and PPP, Ethernet and IEEE 802.3; IEEE 802.11.

Unit III: Network, Transport and Application Layer: **[8 Hrs]**

Network Layer: Internet Protocol (IP) suite; Hierarchical network architectures; IPv4 and IPv6 addressing and headers; Example protocols: OSPF, ICMP, NAT, ARP and RARP.
Transport Layer: Reliable end-to-end transmission protocols; UDP header; Details of TCP header,
Application Layer: Example protocols such as DNS, SMTP, FTP, and HTTP

S.N	Title	Authors	Edition	Publisher
1	Computer Networking - A top- down approach	Kurose and Ross,	7th	Pearson.
2	Computer Networks	Andrew S. Tanenbaum	5th	Pearson Education India.
3.	Computer Networks, A Systems Approach	Peterson and Davie	5th	Elsevier.
4	Computer Networks, A Top-Down Approach	Behrouz A. Forouzan, Firouz Mosharraf	Standard	McGraw-Hill.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Computer Networks: An Open-Source Approach	\Ying-Dar Liu, Ren-Hung Hwang, Fred Baker	2nd	McGraw-Hill.

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24II404P	Technical Skill Development - I	-	-	4	2	50	-	50

Course Objectives	Course Outcomes
1. To develop the ability to utilize MATLAB for solving mathematical and engineering problems by performing operations on variables, arrays, and data structures. 2. To design and implement programs using MATLAB's scripting, user-defined functions, and control statements to address real-world computational challenges. 3. To create visual representations of data through advanced plotting techniques, enabling effective communication of trends and insights.	1. To identify and apply the basic concepts of MATLAB to perform elementary arithmetic operations and manage the work session effectively. 2. To construct and analyze arrays, perform mathematical operations, and utilize built-in functions for handling data and solving computational problems 3. To organize, manage, and demonstrate proficiency in creating script files, handling workspace data, and importing/exporting datasets. 4. To design, implement, and evaluate programs using user-defined functions, control statements, and debugging techniques in MATLAB. 5. To create, interpret, and analyze 2D and 3D plots, using MATLAB tools to effectively visualize and communicate data trends

1. The course will introduce students to the essential concepts of programming using MATLAB, including variables, operators, scripts, functions, control structures, arrays, plotting, and basic data processing.
2. The course is designed to build strong foundational skills that prepare students for higher-level courses in signal processing, image processing, machine learning, IoT, and engineering simulations.
3. This semester, students will also undertake certification freely made available by MATLAB.
4. The students will be able to apply the concepts learned in class to a practical problem such as data analysis, signal visualization, numerical computation, simple simulations, or automation of tasks.
5. The students will gain hands-on experience in writing efficient code, debugging, interpreting outputs, and presenting their results professionally.
6. By the end of the course, students will be able to write MATLAB programs independently, visualize and analyze data, and implement simple algorithmic solutions—laying a strong foundation for future courses and real-world applications.

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INDUSTRIAL IoT

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II405T	Value Education Course	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This course is intended Development of a holistic perspective through self-exploration and development of clarity about harmony between self, family, society and nature.	**Students will be able to** 1. Demonstrate awareness about self and their surroundings and its interdependence. 2. Understand concepts of aspirations and happiness. 3. Recognize and explain the nine universal values in relationship and their application in visualizing a harmonious society. 4. Discuss concepts of conservation of nature and harmony and reusability. 5. Identify the scope of eco-friendly systems for enriching institutions.

Unit I : Introduction **[9Hrs]**

Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations , Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority , Understanding Happiness and Prosperity correctly- A
critical appraisal of the current scenario , Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit II: Understanding Harmony **[9Hrs]**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' , Understanding the needs of Self ('I') and 'Body' - happiness and physical facility , Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
,Understanding the characteristics and activities of 'I' and harmony in 'I' , Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health.

Unit III: Values in relationships **[9Hrs]**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal
harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit IV: Co-existing with nature **[9Hrs]**

Understanding the harmony in Nature , Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Coexistence of mutually interacting units in all-pervasive space ,Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature
(film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit V: Holistics approach for engineers **[9Hrs]**

Natural acceptance of human values , Definitiveness of Ethical Human Conduct , Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order , Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. , Case studies of typical holistic technologies, management models and production systems , Strategy for transition from
the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

Sr.No.	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A. Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak
2	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3	The Story of My Experiments with Truth	M.K.Gandhi	2009	Fingerprint! Publishers

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24II441P	Career Development – IV	-	-	2	01	50	-	50

Course Objectives	Course Outcomes
1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors. 2. This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 3. To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.	1. Students shall understand the concepts of Quadratic Equation, AP, GP, and HP. 2. Students shall understand the concepts of Averages and Mixture and allegations 3. Students shall understand the concepts of Blood relation. 4. Students shall understand the concept of Dice and Cubes 5. Students shall understand the concepts of clocks and Calendars.

Unit I	**[6Hrs]**
Aptitude : Quadratic Equation Arithmetic progression, Geometric progression, Harmonic progression Imax: Critical Thinking, Interview Simulation, Engineering Leadership, Spatial Reasoning	
Unit II	**[6Hrs]**
Aptitude : Average Mixture and Allegation Imax: Interactive Interview Training, Start-Up & Entrepreneurship,	
Unit III	**[6Hrs]**
Aptitude : Blood Relation :- Family Tree, Coding Blood Relation, Pointing to a Person Problem Imax: Engineering Ethics, Employability, Engineering Judgment	
Unit IV	**[6Hrs]**
Aptitude : Cubes and Dice Problems:- Number of cuts to be made, Number of colorful Faces of Cubes, Hidden Dice Number Imax: Disposition for Innovation, Disposition for Start up	
Unit V	**[6Hrs]**
Aptitude : Clocks :- Angle made by Hour hand, Minutes hand, Mirror and water Image of Clock, Behind and Ahead time concept Calendars :- Day on Specific date, Coded Calendars Problems, Calendars repetition Imax: Creating A Winning Resume, Patriotism Self - respect & Start - up	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24II406T	Micro Project – II	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
1. Apply knowledge from Sem I to Sem IV subjects to real-world problem-solving. 2. Design and develop conceptual and working prototypes using ESP32. 3. Integrate sensors, actuators, display/buzzer, and communication modules. 4. Address problems in Agriculture, Rural, Urban, Personal, or Industrial domains. 5. Develop skills in: • Problem identification • System design • Hardware interfacing • Testing and validation • Documentation and presentation	1. Design an ESP32-based IoT system by selecting and integrating appropriate sensors, actuators, and display/buzzer to address a real-world problem in agricultural/rural/urban/personal or industrial domains. 2. Develop and demonstrate a working prototype using ESP32 by implementing embedded logic, testing performance, and validating results through experimentation and documentation.

Syllabus (What students will do in this subject)
In this course, students will:

- Identify a real-life problem from agricultural/rural/urban/personal/industrial domain.
- Design an ESP32-based IoT system with appropriate sensors and output device (LCD/buzzer/LED).
- Develop embedded logic and integrate hardware with software.
- Build and test a working prototype.
- Prepare a brief project report and present their work.

Assessment Plan (Out of 50 Marks)
Assessment will be based on two continuous evaluations only:
Assessment 1 – Seminar (Before Mid-Sem) — 25 Marks
Students will be evaluated on:

- Problem statement and objectives
- System design / block diagram
- Component selection and working methodology

Assessment 2 – Final Evaluation (Before End-Sem) — 25 Marks
Students will be evaluated on:

- Working model demonstration using ESP32
- Implementation and testing
- Results and performance
- Viva-voce
- Final report and presentation

Total Marks = 50 (25 + 25)

Conduction of Course

- The course will be conducted by the faculty assigned with Micro Project load.
- The assigned faculty will:
- Guide students throughout the semester,
- Monitor progress regularly, and
- Conduct both assessments and final evaluation.

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24II431M	MDM – II Introduction to IoT	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
Students will be able to: 1. To understand the fundamentals of networking and different network configurations and models relevant to IoT. 2. To provide an overview of IoT, its characteristics, and various applications. 3. To understand the role of sensors and actuators in IoT systems, including their types and characteristics. 4. To introduce IoT development platforms and communication protocols essential for data transmission. 5. To explore real-world IoT applications and the challenges associated with their implementation.	**Students will be able to:** 1. Identify and explain the basic types of networks and configurations like LAN, WAN, MAN, and gateways also compare OSI and TCP/IP layered network models. 2. Define IoT and explain its key characteristics and application domains also evaluate different IoT connectivity options. 3. Classify and Explain how sensors and actuators interact in an IoT environment. 4. Understand development platforms like Arduino and Raspberry Pi also analyze the suitability of protocols for specific IoT applications. 5. Evaluate the impact and scalability of IoT systems in different domains and the challenges.

Unit I: BASICS OF NETWORKING	**[8 Hrs]**
Basics of Networking: Introduction, Network Types, Network Configurations: LAN, WAN, MAN, Gateway, Layered Network Model: OSI and TCP/IP Model, IPv4, IPV6, Wireless Sensor Networks, Machine to Machine Communication	
Unit II: INTRODUCTION TO IoT	**[10 Hrs]**
IoT Definition, Characteristics, Applications, IoT versus: M2M, CPS, WoT, IoT Enabling IoT and Complex Interdependence of Technologies, IoT Connectivity Technologies: RFID, Zigbee, Bluetooth, IEEE802.15.4, Ethernet, WiFI, LORA	
Unit III: IoT SENSING AND ACTUATION	**[9 Hrs]**
Introduction to Sensor, Sensor Characteristics, Sensing Types, Sensing Consideration, Types of Sensors: Temperature, Humidity, Light, Sound, Actuators, Actuator Types: Hydraulic, Pneumatic, Electric, Mechanical, Actuator Characteristics,	
Unit IV: IoT PLATFORMS AND PROTOCOLS	**[10 Hrs]**
Introduction to Arduino, Introduction to Raspberry Pi, Data formats, Data Protocols: MQTT, CoAP, AMQP, XMPP, REST, WebSocket, SOAP, Infrastructure Protocol: 6LoWPAN	
Unit V: IoT CASE STUDIES	**[8 Hrs]**
Challenges Associated with IoT, Agriculture IoT, Vehicular IoT, Healthcare IoT, Smart City, Smart Homes, Smart Grid, Industrial Iot.	

S. No.	Title	Authors	Edition	Publisher
1	Introduction to IoT	S. Misra, A. Mukherjee, and A. Roy		Cambridge University Press
2	Introduction to Industrial Internet of Things and Industry 4.0	S. Misra, C. Roy, and A. Mukherjee		CRC Press.

TEXT BOOKS

REFERENCE BOOK / NPTEL Course Link

S. No.	Title	Authors	Edition	Publisher
1	Internet of Things: A Hands-on Approach	Arshdeep Bahga, Vijay Madisetti		Universities Press
2	https://onlinecourses.nptel.ac.in/noc24_cs115/preview	Sudip Misra	---	---

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