Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech. in Electronics and Instrumentation
(Common to EI/MX/EE/EX/RW)
(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI401	DCC	Microprocessor and Microcontroller	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
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Input-Output interfacing: Peripherals I/O. PPI 8255 Architecture and modes of operation, Interfacing to 16-bit microprocessor and programming, DMA controller (8257) Architecture, Programmable interval timer 8254, USART 8251.

UNIT III **8 Hrs.**

Introduction to 8051 Microcontroller

Introduction, Difference between Microprocessors and Microcontrollers. Overview of 8051 Microcontroller family, Architecture of 8051 Microcontroller, The program counter and ROM space in the 8051, registers, 8051 register banks.

UNIT IV **10Hrs.**

8051 Assembly Language Programming

Introduction to 8051 assembly programming, Structure of Assembly language, Assembling and running an 8051 program, 8051 data types and directives, interrupts

8051 Addressing Modes & Instruction set

Addressing modes, Accessing memory using various Addressing modes, Bit addresses for I/O and RAM, Arithmetic instructions, Signed number concepts and arithmetic operations, Logic and compare instructions, Rotate instruction, Jump, Loop, And Call Instructions, Call instructions time delay for various 8051 chips.

UNIT V **10 Hrs.**

8051 Programming in C

Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in8051 C, Data conversion programs in 8051 C, Accessing code ROM space in 8051 C, Interfacing with LEDs, LCDs ADCs, DACs.

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BTEI401	DCC	Microprocessor and Microcontroller	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;
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Text Books:

1. 1.A.K. Ray & K.M. Bhurchandi, "Advanced Microprocessors and peripheral-Architecture, Programming and Interfacing", Tata McGraw –Hill, 2012.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C, 2/e", Second Edition, Pearson Education 2008.
3. Kenneth J. Ayala, Dhananjay V. Gadre ,"The 8051 Microcontroller & Embedded Systems using Assembly and C",Cengage Learning , India Edition, 2008.

References:

1. Douglas V. Hall ,"Microprocessor and interfacing", Revised second edition, Macmillan, McGraw Hill 2006.
2. Han Way Huang,"Using the MCS-51 Microcontrollers" , Oxford Uni Press,2000.
3. Rajkamal ,"Microcontrollers Architecture, programming, interfacing and system design" Pearson education.2009.

List of Experiments:

1. Introduction to 8086 & 8051 kit, hardware features & modes of operationand Technique of programming & basic commands of kit.
2. Design programs for Arithmetic Operations.
3. Develop a program to find 1's complement and then 2's complement of a 16-bit numbers.
4. Develop a program to find larger of two numbers.
5. Write a program to shift an 8-bit number left by 2-bits.
6. Write a program to generate a square wave of 2 KHz Frequency on input pin.
7. Introduction to IDE and Assembler directives.
8. Develop 8051 Assembly language programs using Arithmetic/ Logical instructions.
9. 8051 Assembly language programming for block data transfer between internal and external memory including overlapping blocks.

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(2021-2025)

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BTEI401	DCC	Microprocessor and Microcontroller	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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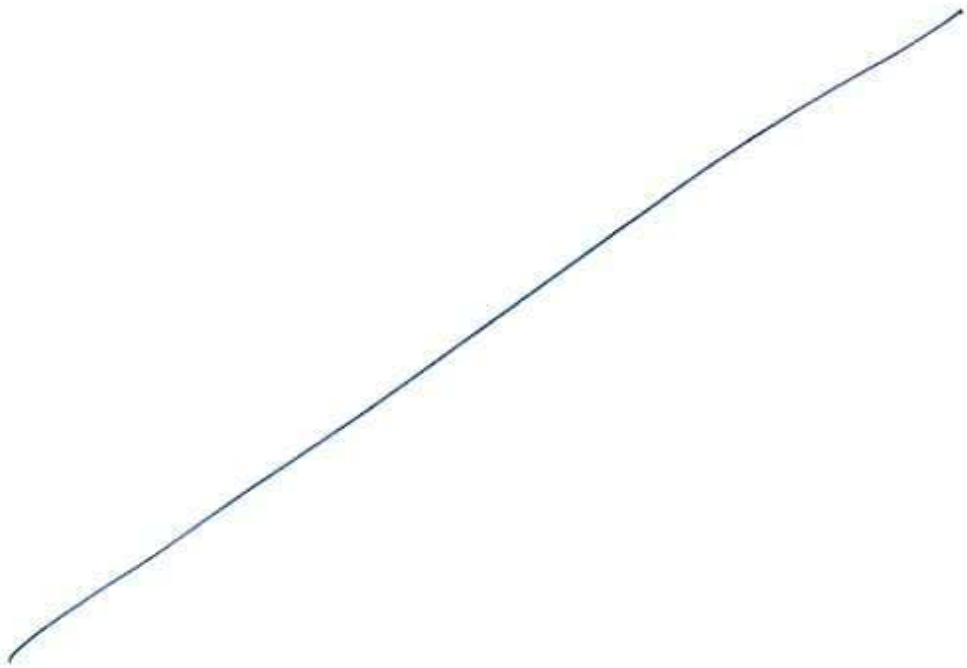
10. 8051 Assembly language programming for
    a. code conversions
    b. Timers in different modes.
    c. I/O port programming in embedded C.
    d. Programming of LCD in embedded C.



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B.Tech. (EC/ECIOT/RA)
(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT501	DCC	Communication Systems	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):
To provide the fundamentals, principles, concepts of communication systems and various modulation techniques of analog and digital communication systems.

Course Outcomes (COs):
After completion of this course the students will be able to:

1. Analyze various analog modulation and demodulation techniques and apply suitable modulation techniques for various applications.
2. Analyze various digital modulation and demodulation techniques and apply suitable modulation techniques for various applications.
3. Understand different types of source and channel coding techniques.

Syllabus:

UNIT I **9 Hrs.**

Amplitude modulation Techniques: Need of modulation, Amplitude modulation: mathematical representation of AM, modulation index, frequency spectrum, single tone and multi tone AM, generation of AM (square law modulator, switching modulator), Detection of AM (Square law detector, envelope detector),
Power distribution, DSB-SC: generation and detection techniques, SSB: generation and detection techniques, VSB.

UNIT II **8 Hrs.**

Angle modulation Techniques: Frequency and phase modulation, spectrum and bandwidth, Narrowband FM, Wideband FM, FM Modulators: Direct and Indirect method of frequency modulation, FM Detectors: Slope Detector, Foster Seeley Discriminators, Ratio-Detectors and PLL detectors, AFC, Pre-Emphasis and De-Emphasis filters.

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(2021-2025)

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT501	DCC	Communication Systems	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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UNIT III **9 Hrs.**

Digital conversion of Analog Signals: Sampling theorem, types of sampling, signal reconstruction and reconstruction filters, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position modulation, Quantization, quantization error, Pulse Code Modulation, Companding, TDM-PCM, Differential PCM, Delta modulation, Adaptive Delta modulation.

UNIT IV **9 Hrs.**

Digital Modulation Techniques: Phase shift Keying (PSK)- Binary PSK, differential PSK, differentially encoded PSK, Quadrature PSK, M-ary PSK and associated Prob. of Error. Frequency Shift Keying (FSK)- Binary FSK (orthogonal and nonorthogonal), M-ary FSK and associated Probability of Error. Comparison of BPSK and BFSK, Quadrature Amplitude Shift Keying (QASK), Minimum Shift Keying (MSK).

UNIT V **8 Hrs.**

Information Theory & Coding: Introduction to Information Theory, Channel Capacity, Source Coding, Entropy Codes: Huffman Coding & Shannon-Fano Coding, Linear Block Codes, Hamming Weight and Distance Properties, Syndrome Decoding, Cyclic Codes, Convolutional Codes.

Text Books:

1. B.P. Lathi and Zhi Ding, "Modern Digital and Analog Communication System"; 4thEdition, Oxford University Press, 2011.
2. Herbert Taub, Donald L Schilling, Gautam Saha, "Principles of Communication Systems, McGraw Hill Education; 4th Edition, 2013.

References:

1. Simon Haykin, Michael Moher, "Communication System", John Wiley, 5th Edition, 2010.
2. R.P. Singh and S.D. Sapre, "Communication Systems: Analog and Digital", McGraw Hill Education; 3rd Edition, 2012.

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(2021-2025)

COURSE CODE	CATE-GORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT501	DCC	Communication Systems	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

3. H P. Hsu: "Schaum's Outline Analog and Digital Communications", McGraw Hill Education, 4th Edition, 2019.
4. John G. Proakis, Masoud Salehi, "Fundamental of Communication Systems", Pearson Edition, 2nd Edition, 2014.

List of Experiments:

1. To synthesize the Fourier series for periodic Signals.
2. To generate the Frequency Spectrum of various signals using Spectrum Analyzer.
3. To analyze characteristics of AM modulator & Demodulators and calculate the modulation Index.
4. To analyze characteristics of FM modulators & Demodulators.
5. To study signal reconstruction and aliasing and calculate sampling frequency for various signals.
6. To observe the waveforms of PAM, PPM and PWM.
7. To analyze the waveform of PCM signal and reconstruct the baseband signal by synchronizing the transmitter and receiver clock.
8. To analyze the Delta modulation waveform and observe the distortion.
9. To analyze Adaptive delta modulation waveform and compare the waveform with DM waveform.
10. To generate the ASK, PSK and FSK modulated signals and their reconstructed signals.

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Name of Program: Bachelor of Technology in Electronics & Communication with Specialization in IOT w.e.f. 2021 Batch

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT603	EC	IOT Architecture and Protocols	60	20	20	0	0	3	0	0	3

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; C - Credit;
***Teacher Assessment** shall be based on the following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The objective of this course is to-

1. To Understand the Architectural Overview of IoT.
2. To Understand the IoT Reference Architecture.
3. To Understand the various IoT Protocols.

Course Outcomes (COs):

After completion of this course the students will be able -

1. To impart knowledge on IoT architecture and various protocols.
2. To implement IoT systems.

Syllabus

UNIT I **08 Hrs**

Overview

Overview of Internet Things: Definition, IOT Vision, Smart Devices, IoT Conceptual Framework, IoT Architectural View, Components of IoT System, M2M Communication: Architecture, Examples of IoT system.

UNIT II **08 Hrs**

Design Principles for Connected Devices

Design standards for IOT/M2M Systems: Modified OSI Model and ITU-T Reference model, Communication technologies: Wireless communication technologies- NFC, RFID, Bluetooth, ZigBee, WiFi. Wired Communication technologies- UART, SPI, I2C, Ethernet.

UNIT III **08 Hrs**

Design Principles for Web Connectivity

Introduction, Communication protocols: Constrained application Protocol (CoAP), M2M communication protocol, JSON format, Tag length Value format, MIME type, Terminologies for Message Communication protocol for connected devices, Communication Protocols: CoAP-SMS, CoAP-MQ, MQTT, XMPP.

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UNIT IV **08 Hrs**

Web Connectivity for Connected Devices

Communication Gateway: HTTP Request and response method, SOAP, REST and RESTful Web application, Websocket, Introduction to Internet Connectivity, Internet Protocol- IPV4 and IPV6, 6LoWPAN, TCP and UDP.

UNIT V **08 Hrs**

IOT Design Methodology

Purpose and Requirement specifications: Process Specification, Domain and Information model specification, Service specification, functional and operational view specification. Case study on IOT System for Weather Monitoring System.

Textbook

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", McGraw Hill, First Edition, 2018.
2. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1st Edition, University Press, 2019.

References:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, Birmingham –Mumbai
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642 19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
5. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							SEM University	Two Term Exam	Assess	SEM University	Assess
BTCS405		Data Base Management System	3	1	2	5	60	20	20	30	20

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE OBJECTIVES:

The student will have ability to:

1. To understand the dissimilar issues concerned in the intend and implementation of a database system.
2. To learn the physical and logical database design, database modelling, relational, hierarchical, and network models
3. To understand and develop data manipulation language to query, modernize, and manage a database
4. To expand an understanding of necessary DBMS concepts such as: database security, integrity, concurrency,
5. To intend and build a straightforward database system and show competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

COURSE OUTCOMES:

Upon completion of the subject, students will be able to:

1. Evaluate business information problem and find the requirements of a problem in terms of data.
2. Understand the uses the database schema and need for normalization.
3. Design the database schema with the use of appropriate data types for storage of data in database.
4. Use different types of physical implementation of database
5. Use database for concurrent use.
6. Backup data from database.

SYLLABUS:

UNIT-I

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Introduction: Concept & Overview of DBMS, Three Schema Architecture of DBMS, Database Approach v/s Traditional File Accessing Approach, Advantages of Database Systems, Data Models, Schema and Instances, Data Independence, Data Base Language and Interfaces, Overall Database Structure, Functions of DBA and Designer, Database Users.
Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets and Extended E-R features.ER Diagram to Relational Table conversion.

UNIT-II
Relational Model: Structure of Relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications of the Database. Domains, Tuples, Attributes, Relations, Characteristics of Relations, Joins and its type. Keys, Key Attributes of Relation, Relational database, Schemas, Integrity Constraints. Referential Integrity, Intension and Extension.

UNIT-III
SQL and Integrity Constraints: Concept of DDL, DML and DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, Assertions, Views, Nested Sub Queries, Database Security Application development using SQL, Stored Procedures and Triggers.
Relational Database Design: Functional Dependency, Different Anomalies in designing a Database.Normalization using Functional Dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using Multi-Valued Dependencies, 4NF, Join Dependency, 5NF.

UNIT- IV
Transaction and Concurrency Control: Physical Data Structures, Query Optimization: Join Algorithm, Statistics and Cost based Optimization. Transaction Processing, Concurrency Control and Recovery Management: Transaction Model properties, State Serializability, Lock base protocols, Two Phase Locking, Time Stamping Protocols for Concurrency Control, and Validation Based Protocol, Multiple Granularities, Granularity of Data Item. Multi version schemes, Recovery with Concurrent Transaction, Recovery technique based on Deferred Update and Immediate Update, Shadow Paging, Recovery in MultiDatabase System and Database Backup and Recovery from Catastrophic Failure

UNIT-V
File Organization and Index Structure: File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree . Mongo DB, No SQL types, Features and tools.

TEXT BOOKS:

1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.GrawHill, 6th Edition,2015.
2. C J Date, “An Introduction to Database System”, Pearson Educations, 8th Edition, 2004
3. Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson Educations 7th Edition, 2016.
4. SeemaKedar, Database Management System, Technical Publications, 2009.

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5. Rajiv Chopra,Database Management System (DBMS) A Practical Approach. Kindle Edition, S Chand (December 1, 2010), 2017.

REFERENCES:

1. R Elmasri and S Navathe "Fundamentals of Database Systems" 7th edition Publisher: Pearson 2017.
2. Abraham Silberschatz and S Sudarshan "Database System Concepts" 6th Edition McGraw-Hill Education – Europe 2013.
3. Raghu Ramakrishnan and Johannes Gehrke "Database Management Systems" McGraw-Hill Education, 2003.
4. Kahate, Atul "Introduction to Database Management Systems"Pearson Education India, 2006.

LIST OF EXPERIMENTS:

1. Design a Database and create required tables. For e.g. Bank, College Database.
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for table and record handling like implementing INSERT statement, Using SELECT and INSERT together, DELETE, UPDATE, TRUNCATE statements and DROP, ALTER statements.
4. Write the queries for Retrieving Data from a Database Using the WHERE clause , Using Logical Operators in the WHERE clause , Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING Clause, Using Aggregate Functions and Combining Tables Using JOINS.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion , updating and deletion using the referential integrity constraints.
10. Write the query for creating the users and their role. Using GRANT and REVOKE operations.

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Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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BTEC515	EC	Data Communication and Computer Networks	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. Introduce the concept of communication protocols and give an overview of Data Communication Standards.
2. Allow the student to gain expertise in specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes:

Student will be able to:

1. Understand the principles of Open Systems and the Transport/Application protocols, which facilitate them.
2. Analyze the services and features of the various layers of data networks.
3. Explain the importance of data communications and the Internet in supporting business communications and daily activities.

Syllabus:

UNIT I **08 Hrs.**

Introduction: data communications, network criteria, categories of networks, network performance and transmission impairments, network devices, protocols and standards, data representation, data transmission, transmission modes, transmission media, LAN topologies, network models, layered tasks, the OSI model, TCP/IP protocol suite, addressing, encoding, switching technique and multiplexing.

UNIT II **10 Hrs.**

Data link control, point-to-point and multi-point links, flow control techniques, error control techniques, HDLC as a bit oriented link control protocol, Ethernet, fast Ethernet, gigabit Ethernet, token ring, token bus, FDDI , multiple access protocols-pure and slotted aloha, wireless LANs: IEEE &02.11 and Bluetooth, introduction to virtual circuit switching including frame relay, X.25.

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UNIT III **10 Hrs.**

Network layer design issues, routing versus forwarding, static and dynamic routing, unicast and multicast routing, distance-vector, link-state, shortest path computation, dijkstra's algorithm, congestion control algorithms, network layer protocols (IP, ICMP, ARP, RARP, DHCP, BOOTP), IP addressing, IPv4, IPv6.

UNIT IV **10 Hrs.**

UDP, TCP and SCTP, multiplexing with TCP and UDP, principles of congestion control, Approaches to congestion control, Quality of service, flow characteristics, techniques to improve QoS.

UNIT V **07 Hrs.**

Domain name system , domain name space, dynamic domain name system, electronic mail and file transfer, WWW, HTTP, SNMP, overview of digital signature and digital certificates technology, cryptography – basic concepts, public/private key encryption.

Text Books:

1. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw–Hill, Fourth Edition, 2011.
2. Andrew S. Tanenbaum, "Computer Networks", Pearson education, Fourth Edition, 2009.

References:

1. Prakash C. Gupta, "Data Communications and Computer Networks", PHI, Second Edition, 2014.
2. Ajit Pal, "Data Communications and Computer Networks", PHI, First Edition, 2014.
3. Wayne Tomasi , "Introduction to Data communications and Networking", Pearson education, First Edition, 2009.

List of Experiments:

1. To study of Different Types of Network Equipment's.
2. To perform data transmission using RS-232 Interface.
3. To perform Synchronous and Asynchronous transmission.
4. To perform Parallel and Serial transmission.
5. To implement Ring topology using DB-9.
6. To implement cross cable connection and straight cable connection.
7. To study of network IP.
8. To implement & simulate various types of routing algorithm using Network Simulator.
9. To simulate STOP AND WAIT Protocols on NS-2.
10. To simulate various Routing Protocol on NS-2.
11. To simulate various Network Topologies on NS-2.
12. To configure routers, bridges and switches and gateway on NS-2.

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Name of Program: Bachelor of Technology in Electronics & Communication

SUBJECT CODE	Category	SUBJECT NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEI611	EC	Data Acquisition System	60	20	20	30	20	3	1	2	5

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To know about the types of transducers and display systems associated with it.
2. To understand the function of Data Acquisition system .
3. To gain information about data acquisition, data logging and application of sensors in condition based monitoring.
4. To learn about communication devices used in Data Acquisition system .

Course Outcomes (COs):

The students will be able to

1. Summarize the working and construction of sensors measuring various physical parameters.
2. Outline operations of various data acquisition and transmission systems.
3. Distinguish smart sensors from normal sensors by their operation and construction.
4. Classify various sensing methods used in condition monitoring.

Syllabus:

UNIT-I **7hr.**

Introduction to Display System: Seven segment, Dot matrix, Multiplexed, Code converter, LCD(construction ,principle), Plasma and vapor displays. Nixie Tube and its principle, OLED , Discharge tubes, application of display systems , interfacing with LED, interfacing with LCD.

UNIT- II **10hr.**

Recorders: Galvanometric type, Null type, Potentiometer type, Strip Chart and circular charttype ,Magnetic tape recorder, principle & operation, Digital tape recorders, Optical storage disk, recorders applications in data acquisition system. Computer control introduction: Need of computer in a control system-Functional block diagram of a computer control system-Data loggers- Supervisory computer control.

UNIT-III **12hr.**

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General Telemetric Systems: land line & RF telemetry, voltage, current and Position telemetry with feedback mechanism, RF telemetry, Amplitude modulation , Frequency modulation , Pulse modulation, pulse amplitude modulation, pulse code modulation, Microwave channels, Radio ink, Transmitting and receiving antenna, telemetry with time and frequency division multiplexing, telemetry hardware.

UNIT-IV **12hr.**

Data Acquisition System(DAS): single channel and multi channel, SuperVisory control and data acquisition system(SCADA), data acquisition system around microprocessor, micro controller & PC, Introduction to PLC: Evolution of PLC's – Sequential and programmable controllers – Architecture-Programming of PLC – Relay
logic – Ladder logic, and its IEEE standard..

UNIT-V **10hr.**

Requirement of communication networks of PLC – connecting PLC to computer – Interlocks and alarms - Case
study of Tank level control system, Data transfer techniques: DMA controller and data transfer in DMA mode, Serial data transmission methods, RS - 232C: specifications connection and timing , RS-422,RS-423 applications GPIB/IEEE-488 standard digital interface use, parallel communication applications in DAS, Local Area networks and its standard, Universal serial bus design with its application , Foundation –Fieldbus, ModBus, TCP/IP.

Text Books:

1. Murty D V S, "Transducers & Instrumentation", PHI, New Delhi (2016)
2. Sawhney A K, "Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai and Sons.(2015)

References:

1. Mathivanan N "Microprocessor PC Hardware and interfacing", PHI, New delhi
2. H S Kalsi " Electronic Instrumentation" TMH, New delhi (2012)
3. Patranabis-Principles of Industrial Instrumentation 3rd Ed., TMH(2009)
4. D.Roy Choudhury and Shail B.Jain, Linear Integrated circuits, New age International Pvt. Ltd, 2003.

List of Experiments:

1. To learn about basics of LabView and its HMI(Human Machine Interface).
2. To Study the Various Palettes Used in LabView to create virtual instruments.
3. To perform and Study of Creation of Virtual Instruments, (Creation of Random Wave Analyzer.)
4. Implement Virtual Instrument (Random Wave Analyzer) & Control its Wave plot Speed by adding Time Delay.
5. Develop Virtual Instrument (Random Plot Analyzer) and Also add a function that will calculate the mean values of Plot.
6. Design a HMI of PLC using LabView.
7. Develop HMI using LabView for Fahrenheit (°F) to Celsius (°C).

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8. Design a table to create data logging.
9. Write a program for table of 2 using loop.
10. Design a HMI to display sine wave

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(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTME510	AESE	DESIGN THINKING AND INNOVATION	60	20	20	0	0	2	0	0	2

Legends: L - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The objective of this course is to provide (A) the new ways of creative thinking and learn the innovation cycle of design thinking process, (B) understand product design and prototyping and (C) develop innovative product.

Course Outcomes (COs):

After completion of this course student will able to

1. Compare and classify the various learning styles and memory techniques and apply them in their engineering education
2. Analyze emotional experience and inspect emotional expressions to better understand users while designing innovative products
3. Develop new ways of creative thinking and learn the innovation cycle of design thinking process for developing innovative products
4. Propose real-time innovative engineering product designs and choose appropriate frameworks, strategies, techniques during prototype development
5. Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

Syllabus

Unit I **(6 Hrs)**

Learning: understanding the learning process, Kolb's learning styles, assessing and interpreting.

Memory: understanding the memory process, problems in retention, memory enhancement techniques.

Emotions: understanding emotions, experience & expression, assessing empathy, application with peers.

Unit II **(6 Hrs)**

Design Thinking: definition, need, objective, concepts & brainstorming, stages of design thinking process (explain with examples) – **empathize, define, ideate, prototype, test**.

Creative Thinking: understanding creative thinking process, understanding problem solving, creative problem solving test.

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BTME510	AESE	DESIGN THINKING AND INNOVATION	60	20	20	0	0	2	0	0	2

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Unit III **(6 Hrs)**

Product Design: process of engineering product design, design thinking approach, stages of product design, examples of best product designs and functions, assignment – engineering product design. Prototyping: What is prototype? Why prototype? Rapid prototype development process, testing, sample example, test group marketing

Unit IV **(6 Hrs)**

Celebrating the Difference: understanding individual differences & uniqueness, group discussion and activities to encourage the understanding, acceptance and appreciation of individual differences Customer Centricity: practical examples of customer challenges, use of design thinking to enhance customer experience, parameters of product experience, alignment of customer expectations with product design.

Unit V **(6 Hrs)**

Feedback, Re-design & Re-create: feedback loop, focus on user experience, address "ergonomic challenges, user focused design, rapid prototyping & testing, final product, final presentation – **"solving practical engineering problem through innovative product design & creative solution".**

Text and Reference Books:

1. E. Balaguruswamy "Developing Thinking Skills (The way to Success)" Khanna Book Publishing Company, 2022.
2. Gavin Ambrose and Paul Harris "Basics Design 08: Design Thinking" Bloomsbury Publishing India Pvt. Ltd. 2009.
3. Vijay Kumar "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization" Wiley Pub. 2012.
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
5. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
6. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.

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Choice Based Credit System (CBCS) in the Light of NEP-2020
B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)
(2021-2025)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC 507	DCC	Programming in Python	0	0	0	30	20	0	0	2	1

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Course Objective:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.

Course Outcome:

After learning the course, the student will be able:

1. To develop proficiency in creating applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to do text filtering in Python.

Syllabus

UNIT I

Introduction: History of Python, Need of Python Programming, Running Python Scripts, Variables, Assignment, Operators and Expressions: Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations.

UNIT II

Data Structures: Lists, Tuples, Sets, Dictionaries, Sequences.
Control Flow - if, if-elif-else, for, while, break, continue. Functions - Defining Functions, Calling Functions, Passing Arguments. Modules: Creating modules, import statement, from, import statement, name spacing.

UNIT III

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

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B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)
(2021-2025)

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BTEC 507	DCC	Programming in Python	0	0	0	30	20	0	0	2	1

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UNIT IV

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data Hiding.

UNIT V

File Handling: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data.

List of Experiments:

1. Develop programs to understand the control structures of python.
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
3. Write a Python program to sum all the items in a list.
4. Write a Python program to get the largest and smallest number from a list.
5. Develop programs for data structure algorithms using python – searching and sorting.
6. Write a Python Program to perform Linear Search.
7. Write a Python Program to perform Binary Search.
8. Write a Python Program to perform Selection sort.
9. Write a Python Program to perform Insertion sort.
10. Write a Python Program to perform Merge sort.
11. Write a Python program to get a list, sorted in increasing order by the last element in each tuple from a given list of non-empty tuples: Sample List: [(2, 5), (1, 2), (4, 4), (2, 3), (2, 1)] Expected Result: [(2, 1), (1, 2), (2, 3), (4, 4), (2, 5)]
12. Write a Python program to check a list is empty or not.
13. Write a Python program to remove duplicates from a list.
14. Programs that take command line arguments (word count).
15. Write a Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File.
16. Write a Program to Read a Text File and Print all the Numbers Present in the Text File.

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B.Tech.(EC/ EC-IOT/RA/EE/EX/EI/MTX)
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BTEC 507	DCC	Programming in Python	0	0	0	30	20	0	0	2	1

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17. Write a Program to find the most frequent words in a text read from a file.
18. Implement Object Oriented Programming concepts in Python.
19. Write A Program to Append, Delete and Display Elements of a List Using Classes.
20. Write A Program to Create a Class and Compute the Area and the Perimeter of the Circle.
21. Write A Program to Create a Class which Performs Basic Calculator Operations.
22. Write A Program to Create a Class in which One Method Accepts a String from the User and another prints it.
23. Learn to plot different types of graphs using PyPlot.

References:

1. John V Guttag. "Introduction to Computation and Programming Using Python", 3nd edition,Prentice Hall of India, 2021
2. Wesley J. Chun. "Core Python Programming" 3rd Edition, Prentice Hall, 2012
3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", Wiley, 2013
4. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication, 2nd edition, 2018.

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