Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: Bachelor of Technology in Electronics & Communication with Specialization in IOT

SUBJECT CODE	Cate-gory	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*				
BTEC501	EC	Microprocessor, Microcontroller and Interfacing	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 provide basic knowledge of Microprocessor & Microcontroller.
2. To develop the programming skills of 8085 microprocessor & 8051 microcontroller.
3. To provide the knowledge of interfacing of external devices with the 8051 microcontroller.

Course Outcomes (COs):

After completion of this course the students will be able to-

1. Apply the concept of buses, microprocessor & microcontroller architecture and interrupts
2. Interface memory and I/O devices with microprocessor & microcontroller.
3. Develop assembly language programs efficiently for solving problems.
4. Interface external devices with 8051 microcontroller.
5. Design and develop microcontroller based small system

Syllabus

UNIT I

8085 Microprocessor **8 Hrs.**

Introduction to Microprocessors: History, Von-neumann and Harvard architecture, RISC and CISC. 8085 Microprocessor: Pin Description, Register Organization, Flag Register, ALU, Control & Timing Unit, Memory Interfacing, IO Interfacing, Memory-Mapped I/O, Timing diagram for I/O and memory.

UNIT II

Assembly Language Programming of 8085 **9 Hrs.**

Addressing Modes of 8085 Microprocessor, Instruction Format: Op-code and Operand, Classification of Instructions, Instruction Set: Data transfer, Arithmetic, Logical, Branch and Machine Control, Concept of stack, 8085 interrupts, Development of 8085 Assembly Language Programs: Counter & Delay Programs.

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UNIT III **9 Hrs.**

Peripheral Devices

Programmable input/output ports 8255A: Configuration, Modes and Operation. Programmable interval timer 8253, keyboard/display controller 8279, Programmable communication interface 8251 USART, DMA controller 8257.

UNIT IV **9 Hrs.**

Introduction to Microcontrollers

Introduction, Microprocessors versus Microcontrollers, Microcontroller families, 8051 Microcontroller: Architecture, Pin Description, Register Organization, Special Function Registers, Memory and IO Addressing, Interrupts of 8051.

UNIT V **8 Hrs.**

8051 Assembly language Programming

Assembly Language Programming in 8051: Addressing Modes of 8051, Instruction Set: Data Transfer, Arithmetic & Logic Instruction, Branching Instruction. I/O Port Programming, Timer & Counter Programming, Interfacing with LED, 7-Segment Display, LCD & Motor.

Text Books:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and application with 8085", 6th Edition, Penram International Publishing, 2013.
2. B. Ram, "Fundamentals of Microprocessors and Microcontrollers", 6th Edition, Dhanpat Rai Publications, 2010.
3. A.K. Ray & K.M. Bhurchandi, Advanced Microprocessors and Peripheral-Architecture, Programming and Interfacing, 3rd Edition Tata McGraw –Hill, 2012
4. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd edition, Pearson Education, 2008.

References:

1. Douglas V. Hall, "Microprocessors and Interfacing: Programming and Hardware", 3rd Edition, Tata McGraw Hill Publishers, 2012.
2. Rajkamal, "Microcontrollers Architecture, programming, interfacing and system design" Pearson education, 2009.
3. Kenneth J. Ayala, Dhananjay V. Gadre, "The 8051 Microcontroller & Embedded Systems using Assembly and C" Cengage Learning, 2008
4. Barry B. Brey, "The Intel Microprocessors – Architecture, Programming And Interfacing", 8th Edition, Pearson Education, 2008.

List of Experiments:

1. Introduction to 8085 & 8051 hardware boards and IDE.
2. Develop programs in 8085 for data transfer operation.
3. Develop programs in 8085 for Arithmetic & Logical Operations.
4. Develop a program in 8085 to find 1's complement and 2's complement of a number.
5. Develop a program in 8085 to find larger number out of two numbers.
6. Develop 8051 Assembly language programs for data transfer from one location to another.
7. Develop 8051 Assembly language programs using Arithmetic/ Logical instructions.
8. Develop 8051 Assembly language program to generate a square wave of 2 KHz frequency.
9. Develop 8051 Assembly language programs for code conversions
10. Develop 8051 Assembly language programs for Timers in different modes.

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11. Develop 8051 Assembly language programs for LED & LCD Interfacing
12. Develop 8051 Assembly language programs for motor control.

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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;
*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:

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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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTECIOT501	EC	Communication Systems	60	20	20	30	20	3	0	2	4

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

Course Objectives:

To provide the basic fundamentals, principles, concepts of communication systems and various modulation techniques of analog and digital communication systems.

Course Outcomes:

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 Hours**

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.

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UNIT II **8 Hours**

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.

UNIT III **9 Hours**

Digital conversion of Analog Signals

Sampling theorem, types of sampling, signal reconstruction and reconstruction filters, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), Quantization, quantization error, Pulse Code Modulation (PCM), Companding, TDM-PCM, Differential PCM, Delta modulation, Adaptive Delta modulation.

UNIT IV **9 Hours**

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 Prob. of Error. Comparison of BPSK and BFSK, Quadrature Amplitude Shift Keying (QASK), Minimum Shift Keying (MSK).

UNIT V **8 Hours**

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"; 4th Edition, 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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3. H P. Hsu: "Schaum's Outline Analog and Digital Communications", McGraw Hill Education, 3rd Edition, 2009.
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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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*				
BTECIOT502	EC	Wireless and Mobile Communication	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 following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The subject aims to provide the student with:

1. To impart fundamental concepts in models of mobile radio channels, wireless technologies adapted and wireless networks.
2. Be acquainted with different interference factors influencing wireless and mobile communications.
3. To efficiently use the background behind developing different path loss and/or radio coverage in mobile environment.
4. To expose the students to the most recent technological developments in mobile communication systems.

Course Outcomes (COs):

1. Students will get familiar with basic terminology as mobile station, base station and mobile telephone switching office.
2. Develop the capability to analyze and design propagation models for mobile radio channel.
3. Learn how to reduce co-channel and non co-channel interference.
4. Know about principle of CDMA, GSM and OFDM technologies.

Syllabus:

UNIT I **08 Hrs.**

Introduction To Cellular Mobile Systems: Limitations of Conventional Mobile Telephone System, Basic Cellular Systems,Concept of Frequency Reuse, Co-channel Interference Reduction Factor, Desired C/I in An Omni-directional Antenna System, Sectoring and Cell Splitting, System Capacity,Concept of Handoff, Types of Handoff, Queuing of Handoff.

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UNIT II **10 Hrs**

Cell Coverage for Signal: Signal Reflections in Flat and Hilly Terrain, Effect of Human Made Structures, Phase Difference between Direct and Reflected Path, General Formula for Mobile Propagation Between Two Fixed Station Over Water and Flat Open Area.

Interference in Cellular Mobile System: Co-channel Interference: Design of an Omni-directional Antenna System and Directional Antenna System, Lowering the Antenna Height, Power Control, Reduction in C/I by Tilting Antenna, Umbrella Pattern Effect. Non Co-channel Interference: Adjacent-Channel Interference, Next Channel Interference and Neighboring Channel Interference, Near-End Far-End Interference.

UNIT III **08 Hrs**

Introduction to wireless standards (2G/3G/4G), BER performance of Communication system in AWGN channel, modeling of Wireless systems, Rayleigh fading channel, BER performance of wireless system, channel estimation.

Wireless Propagation channels Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, and temporal dependence of fading, large scale fading.

UNIT IV **08 Hrs**

Diversity: Introduction, micro diversity, macro diversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity.

Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), and comparison of equalizer structures, fractional spaced equalizers, blind equalizers.

UNIT V **10 Hrs**

Multiple Access Techniques: Principle of OFDM, Transmitter and Receiver block diagram of OFDM, FDMA/FDD, TDMA/TDD, CDMA, SDMA and OFDMA/SC-FDMA/SOFDMA/MIMO, GSM System Architecture, GSM Radio Subsystem, GSM Channel Types, Frame Structure for GSM, Signal Processing in GSM, GPRS and EDGE.

Text Books:

1. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", 3rd Edition, Tata McGraw Hill Publication, 2017.
2. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition,Pearson / PHI Publication, 2010.
3. Aditya Jagannatham, "Principles of Modern Wireless Communication Systems: Theory & Practice", 1st Edition, McGraw Hill, 2016.

References:

1. Iti Saha Misra, "Wireless Communications and Networks: 3G and Beyond", 2nd Edition, Tata McGraw Hill Publication, 2013.
2. Gordon L. Stuber, "Principles of Mobile Communications", Springer International 2nd Edition, 2007.
3. William Stallings, "Wireless Communications and Networks", 2nd Edition, Pearson Education, 2005.
4. Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2nd Edition.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTEC504	EC	CMOS VLSI Design	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 inculcate the concepts of CMOS VLSI Design and relate its importance in today's scenario.
To impart knowledge based on design of analog as well as digital VLSI circuits.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes
The students will be able to:

1. Demonstrate the working and device physics related to CMOS.
2. Design circuits based on combinational logic.
3. Design analog circuits related to CMOS.
4. Draw stick diagrams and design layouts for different devices and circuits.

Syllabus

UNIT I **9 Hrs.**

Introduction / Orientation: VLSI Design flow, Y- Chart, Structured design strategies: Hierarchy, Regularity, Modularity and Locality. Design Methods: Microprocessor/DSP, Programmable Logic, GA and SOG, Cell based design, Full custom Design; Platform based design/SOC. Design Economics.

UNIT II **10 Hrs.**

MOS Transistor Theory: MOS device equations, Second order effects: Mobility degradation and velocity saturation, Body effect, Short channel effects, Narrow width effects. CMOS Inverter DC Characteristics-VI Characteristics, Beta Ratio effects, Noise Margin. Scaling - Transistor Scaling, Supply Voltage Scaling, Interconnect Scaling.

UNIT III **9 Hrs.**

Delay and Power Considerations: Delay Definitions, Transient response, RC Delay model, Linear Delay Model. CMOS Logic implementations and Logical Effort. Power Definitions, Dynamic Power, Static Power, Latch up triggering and prevention.

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UNIT IV **8 Hrs.**

CMOS Processing Technology: Wafer Formation, Photolithography, N-well process, Twin tub process, Stick Diagrams, layout design rules, CMOS process enhancements.

UNIT IV **9 Hrs.**

Analog CMOS design: Introduction to analog design, Current Mirror, Single stage amplifier: Common source with diode, resistive and current source connected load, Source follower, Differential amplifiers. Frequency response: Miller effect, Association of Poles with nodes, common source stage and source followers.

Text Books:

1. Neil H.E. Weste, David Money Harris, "CMOS VLSI Design, A circuits and systems perspective", 4th Edition, Pearson, 2010.
2. Neil H.E. Weste, David Money Harris Ayan Banerjee, "CMOS VLSI Design, A circuits and systems perspective", 4th Edition, Pearson Education, 2010.
3. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata McGraw-Hill Education, 2016.
4. Peter Van Zant, "Microchip Fabrication, A Practical Guide to Semiconductor Processing", 6th Edition, McGraw Hill Professional, 2013.

References:

1. Sung Mo Kang, Yusuf Lebliabici, "CMOS Digital Integrated Circuits: Analysis and Design", 4th Edition, Tata McGraw Hill, 2015.
2. Douglas A. Pucknell, Kamran Eshraghian, "Basic VLSI Design",3rd Edition, Prentice Hall, 1994.
3. S. M. Sze, VLSI Technology, 2nd Edition, Tata McGraw-Hill Education, 2003.

List of Experiments:

1. Introduction to layout EDA tools and Technologies.
2. Study of Stick Diagrams and Euler's Path.
3. Layout Design of Resistors, Capacitors and MOSFETS.
4. Layout Design for Logic gates.
5. Layout Design for Half adder and Full adder.
6. Layout Design for Multiplexer.
7. Layout Design for Encoders and Decoders.
8. Layout Design for SRAM.
9. Layout Design for Flip Flops.
10. Layout Design for 4-Bit Multiplier.
11. Study of different packages and Bonding pads.

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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 802.11 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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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.

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UNIT-III **12hr.**

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.

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6. Design a HMI of PLC using LabView.
7. Develop HMI using LabView for Fahrenheit (°F) to Celsius (°C).
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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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BTIT 406	UG	UNIX and Shell Programming Lab	0	0	2	1	-	-	-	-	50

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. To provide introduction to UNIX Operating System and its File System.
2. To gain an understanding of important aspects related to the SHELL and the process
3. To develop the ability to formulate regular expressions and use them for pattern matching.
4. To provide a comprehensive introduction to SHELL programming, services and utilities.
5. To develop the ability to perform different networking tasks.

COURSE OUTCOMES:

On completion of this course:

1. Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System
2. Demonstrate UNIX commands for file handling and process control
3. Write Regular expressions for pattern matching and apply them to various filters for a specific task
4. Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.
5. Diagnose network using different networking utilities of UNIX.

SYLLABUS:

UNIT I:

Introduction to UNIX - The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal and External Commands, Command Structure.
General purpose utilities: cal, date, echo, printf, bc, script, passwd, path, who, uname, tty, stty, pwd, cd, mkdir, rmdir,od.

UNIT II:

Handling Files and C Environment - The File System, cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff, gzip, tar, zip, df, du, mount, umount, chmod, The vi editor ,security by file Permissions. Networking commands: ping, telnet, ftp, finger, arp, rlogin.
The C compiler, vi editor, compiler options, and run the programs.

UNIT III:

Shell Basics - Types of shells, Shell Functionality, Work Environment, Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical expressions. Conditional statements: If-else-elif, Test command, Logical operators - AND, OR, NOT, Case –esac. Loops: While, For, Until, Break & continue.

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UNIT IV:

Command Line Arguments & Regular Expression - Command line arguments: Positional parameters, Set & shift, IFS. Functions & file manipulations: Processing file line by line, Functions. Regular Expression & Filters: Regular expression, Grep, cut, sort commands, Grep patterns.

UNIT V:

SED and AWK - SED: Scripts, Operation, Addresses, commands, Applications, grep and sed. AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

TEXT BOOKS:

1. Stephen Prata "Advanced UNIX: A Programming's Guide", BPB Publications, 2017.
2. Maurice J. Bach "Design of UNIX O.S. ", PHI Learning, 2015.
3. Brian W. Kernighan & Robe Pike, "The UNIX Programming Environment", PHI Learning, 2015.
4. Sumitabha Das: "YOUR UNIX – The Ultimate Guide", Tata McGraw Hill, 23rdreprint, 2012.
5. Yashavant Kanetkar, "Unix Shell programming", 1st Edition, BPB Publisher, 2010.

REFERENCES:

1. Behrouz A. Forouzan, Richard F. Gilbery, "Unix and Shell Programming", 1st Edition, Cengage Learning India, 2003.
2. Graham Glass, King Ables, "Unix for programmers and users", 3rd Edition, Pearson Education, 2009.
3. Sumitabha Das, "Unix Concepts and Applications", 4th Edition. TMH, 2006.
4. N.B. Venkateswarlu, "Advanced Unix programming", 2nd Edition, B S Publications, 2010.

LIST OF EXPERIMENTS:

1. Perform installation of UNIX/LINUX operating system.
2. Study of UNIX general purpose utility commands.
3. Execution of various file/directory handling commands.
4. Working with the vi editor: Creating and editing a text file with the vi text editor using the standard vi editor commands.
5. Write a shell script for calculator (to perform basic arithmetic and logical calculations).
6. Write a shell script sum.sh that takes an unspecified number of command line arguments (up to 9) of ints and finds their sum. Modify the code to add a number to the sum only if the number is greater than 10.
7. Write a shell script that will take an input file and remove identical lines (or duplicate lines from the file).
8. Write a shell script takes the name a path (eg: /afs/andrew/course/15/123/handin), and counts all the sub directories (recursively).
9. Shell scripts to explore system variables such as PATH, HOME etc.
10. Write a shell script that takes a name of a folder as a command line argument, and produce a file that contains the names of all sub folders with size 0 (that is empty sub folders)

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11. Execution of various system administrative commands.
12. Write awk script that uses all of its features.
13. Write a shell script to display list of users currently logged in.
14. Write a shell script to delete all the temporary files.
15. Write a shell script to search an element from an array using binary searching.
16. Write shell script to perform different string operations of arrays.

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