# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## 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* | | | | |
| 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** **8 Hrs.**

**8085 Microprocessor**

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** **9 Hrs.**

**Assembly Language Programming of 8085**

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.

**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.

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

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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* | | | | |
| BTEC502 | EC | Cellular 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 cellular technology, models of mobile radio channels, communication technologies adapted and wireless networks.
2. Be acquainted with different interference factors influencing cellular and mobile communications.
3. To efficiently use the background behind developing different path loss and/or radio coverage in cellular 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 cellular 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 implementation of digital cellular system.

**Syllabus**

**UNIT I** **8 Hrs.**

**Introduction to Cellular Mobile Systems**: Limitations of Conventional Mobile Telephone System, Basic Cellular Systems, Performance Criteria, Free-Space propagation model for mobile communication, Radio Propagation mechanism: reflection, diffraction, scattering and interference.

**UNIT II** **9 Hrs.**

**Cellular Concept:** Operations of Cellular system, Concept of Frequency Reuse, Co-channel Interference Reduction Factor, Desired C/I in an Omni-directional Antenna System, Sectoring and Cell Splitting, System Capacity, Trunking and Grade of Service (GOS), Concept of Handoff, Types of Handoff, Queuing of Handoff.

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**UNIT III** **8 Hrs.**

**Cell Coverage for Signal and Traffic:** Signal Reflections in Flat and Hilly Terrain, Effect of Human Made Structures, Phase Difference between Direct and Reflected Paths, Straight Line Path Loss Slope, General Formula for Mobile Propagation between Two Fixed Station over Water and Flat Open Area, Near and Long Distance Propagation, Point to Point model.

**UNIT IV** **9 Hrs.**

**Interference in Cellular Mobile System:** Co-channel Interference: Interference in co-channel cell, comparison N=4 and N=7 cellular system. Non Co-channel Interference: Adjacent-Channel Interference, Next Channel Interference and Neighboring Channel Interference, Near-End Far-End Interference, Rake receiver

**Frequency Management, Channel Assignment:** Numbering the radio channels, Set-up Channels, Channel Assignment Schemes: Fixed and Dynamic Channel Assignment Schemes, Sharing and Borrowing concept.

**UNIT V** **8 Hrs.**

**Digital Cellular System:** Multiple Access Techniques – FDMA, TDMA and CDMA, GSM System Architecture, GSM Radio Subsystem, GSM Channel Types, Frame Structure for GSM, Signal Processing in GSM.

**Text Books:**

1. William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", 2nd Edition, Tata McGraw Hill Publication, 2017.
2. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson / PHI Publication, 2010.

**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. Siegmund M. Redl, Mathias K. Weber, Malcolm W. Oliphant, "An Introduction to GSM", Artech House Publishers, 1998.

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| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTEC503 | EC | Digital Communication | 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 following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**Course Educational Objectives (CEOs):**

1. Understand basic components of digital communication systems.
2. Design optimum receivers for digital modulation techniques.
3. Analyze the error performance of digital modulation techniques.
4. Understand the information theory concepts

**Course Outcomes (COs):**

After successfully completing the course students will be able to

1. Define Sampling theorem and explain the various aspects of sampling theorem viz. Aliasing, signal distortion. Also explain various Pulse modulation Techniques
2. Describe different digital modulation schemes, and compare advantages and disadvantages of each as applied to baseband signal.
3. Describe the concept of optimum receiver and analyze error performance of various modulation techniques
4. Describe the concepts of information theory and various coding techniques

**Syllabus**

**UNIT I** **10 Hrs.**

**Analog to Digital Conversion**

Introduction to Sampling theorem, Ideal sampling, Natural sampling, Flat top sampling, Spectrum of Sampled Signal, Aliasing, Nyquist Criterion, Signal Reconstruction from Sampled Signal, Pulse Amplitude Modulation, Quantization, Uniform Quantizers: Midrise and Midtread, Quantization noise, Non uniform Quantization, Pulse Code Modulation, Differential Pulse Code Modulation (DPCM), Delta Modulation and Adaptive Delta Modulation.

**UNIT II** **9 Hrs.**

**Random Variables**

Cumulative distribution function, Probability density function, Mean, Variance and standard deviations of random variable, Gaussian distribution, Error function, Correlation and Autocorrelation, Central-limit theorem, Error probability, Power Spectral density of digital data.

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**UNIT III** **10 Hrs.**

**Digital Modulation Techniques**

Amplitude shift keying, Binary Phase shift Keying (BPSK), differential PSK, differentially encoded PSK, Quadrature PSK, M-ary PSK. Binary Frequency Shift Keying (orthogonal and nonorthogonal), M-ary FSK. Comparison of BPSK and BFSK, Quadrature Amplitude Shift Keying (QASK), Minimum Shift Keying (MSK).

**UNIT IV** **8 Hrs.**

**Pulse shaping and Optimum Receivers**

Line coding, Intersymbol interference, Inter channel interference, Eye pattern, Nyquist Criterion for Pulse Shaping, Optimal Receiver Design, Signal-to-Noise Power Ratio (SNR), Matched Filtering (MF), Maximum Likelihood (ML) Receiver, Probability of Error for ASK, BPSK, BFSK

**UNIT V** **8 Hrs.**

**Information Theory and 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. Taub , Schilling and Saha, "Principles of Communication System", 4th edition, McGraw-Hill, 2015.
2. B.P Lathi., "Modern analog and Digital Communication Systems", 4th edition, Oxford Uni. Press, 2010.

**References:**

1. Haykins Simon, "Digital Communication", 5th edition, Wiley Publication, 2010.
2. Proakis, "Digital Communication", 5th edition, McGraw Hill, 2008.
3. H P Hsu, "Analog and Digital Communication", 2nd edition, Schaum's Outline series, 2012.
4. B. Sklar, "Digital Communication", 2nd edition, Pearson Education, 2016.

**List of Experiments:**

1. To analyze the Sampling Process, Signal Reconstructing and Aliasing.
2. To analyze analog Pulse Modulation Schemes (PAM, PWM & PPM).
3. To analyze Pulse Code Modulation (PCM) & Time Division Multiplexing
4. To analyze Delta Modulation
5. To analyze Adaptive Delta Modulation.
6. Generation of NRZ-L, NRZ-M, RZ, Manchester line and Bi-phase Mark line codes.
7. To study and analyze Binary Amplitude Shift Keying
8. To study and analyze Binary Frequency Shift Keying
9. To study and analyze Binary Phase Shift Keying
10. To study and analyze Quadrature Shift Keying and Differential phase-shift keying

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| | | | 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 &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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| | | | THEORY | | | PRACTICAL | | L | T | P | CREDITS |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| BTEC525 | EC | FPGA Based System 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

The objective of this course is to-

1. Introduce basic concepts of Verilog Hardware Description Language.
2. Describe FPGA implementation of digital systems.

### Course Outcomes

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

1. Describe digital hardware in terms of its structure or behavior using Verilog HDL.
2. Configure FPGA boards for specific design need.

### Syllabus

**UNIT I** **9 Hrs.**

**Programmable Logic Devices and Computer Aided Design Tools:**

Introduction to design of digital hardware, Programmable Logic Devices- PAL, PLA, CPLD and FPGA.CAD Tools: Introduction, Design flow, Synthesis, RTL Synthesis, Overview of Synthesis Steps, Net List Generation, Gate Optimization, Technology Mapping, Simulation, Functional and Timing Simulation, Physical Design Steps- Placement , Routing and Static Timing Analysis.

**UNIT II** **9 Hrs.**

**Verilog HDL Basics**

Introduction of HDL, Verilog and VHDL, Top Down and Bottom Up design, Data Flow Modeling , Structure and Behavioral Modeling, Verilog Basic Constructs, White Space, Comments, Nets and Variables, Data Types, Identifiers, Signal Values, Numbers, Parameters.

Module and Ports- Module Declaration, List of Ports, Port Types, Port Declaration, Port Connection Rules.

**UNIT III** **9 Hrs.**

**Concurrent Statements**

Verilog Operators:Arithmetic,Bitwise, Logical, Reduction, Relational,Shift,Conditional, Concatenation, Replication. Operator Precedence, Gate Instantiation, Signal Assignments, Continuous Assignment, Delays, Data Flow Modeling and Structure Modeling, Module Instantiation,Design of various Combinational Logic Circuits i.e. Adders, Multiplexers, Encoders and Decoders.

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**UNIT IV** **9 Hrs.**

**Procedural Statements**

Always and Initial Block, Sensitivity List, Blocking and Non Blocking Assignments, If-else Statements,Case Statements, For Loop, While Loop, Repeat and Forever Loop, Generate statement, Verilog Function and Task, Finite State Machines- Melay and Moore Models, Behavioral Modeling of Various Combinational Circuits. Behavioral Modeling of Various Sequential Circuits- Latches and Flip Flops, Shift Registers and Counters, Mealy and Moore Finite State Machines.

**UNIT V** **9 Hrs.**

**Test Bench**

Verification Concepts, Test Bench Overview, Linear Test bench, File I/O Based Test bench, State Machine based Test bench, Task based Test bench, Self Checking Test bench, Stimulus Generator, Bus Functional Models, Driver, Receiver, Protocol Monitor, Scoreboard, Checker, Coverage. Code Coverage, Functional Coverage, Task and Function.

**Text Books:**

1. Stephen Brown I Zvanko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 3rd Edition, Mc Graw Hill, 2014.
2. Samir Palnitkar : Verilog HDL – A Guide to Digital Design and Synthesis, 2nd Edition, Pearson, , 2003.

**References :**

1. Peter Wilson: Design Recipes for FPGA using Verilog and VHDL, 2nd Edition, Newnes Publication, 2016.
2. M. Morris Mano, Michael D. Cilletti: Digital Design With An Introduction to The Verilog HDL, 5th Edition, Pearson, 2012.

**List of Experiments:**

Students should implement and verify digital logic design using Verilog HDL. After synthesis and simulation the design should be implemented on FPGA board.

1. Design of Boolean Functions using Gate Instantiation.
2. Design of various Adders Circuits.
3. Design of various Multiplexers.
4. Design and analysis of Encoder and Decoders.
5. Design of various Latches and Flip Flops with Preset and Clear capability.
6. Design of various Shift registers.
7. Design Johnson and Ring counters.
8. Design Synchronous and Asynchronous Up/Down Counters.
9. Design of Frequency Divider Circuit.
10. Design of Mealy and Moore Finite State Machines.

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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* | | | | |
| 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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# Shri Vaishnav VidhyapeethVishvavidhyalaya, Indore

## 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* | | | | |
| BTEC507 | EC | 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;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**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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**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.
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", 2nd edition,Prentice Hall of India, 2013
2. Wesley J. Chun. "Core Python Programming" 2nd Edition, Prentice Hall, 2006
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, 1st edition, 2011


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