

**M.Sc. Electronics and Communication Systems**

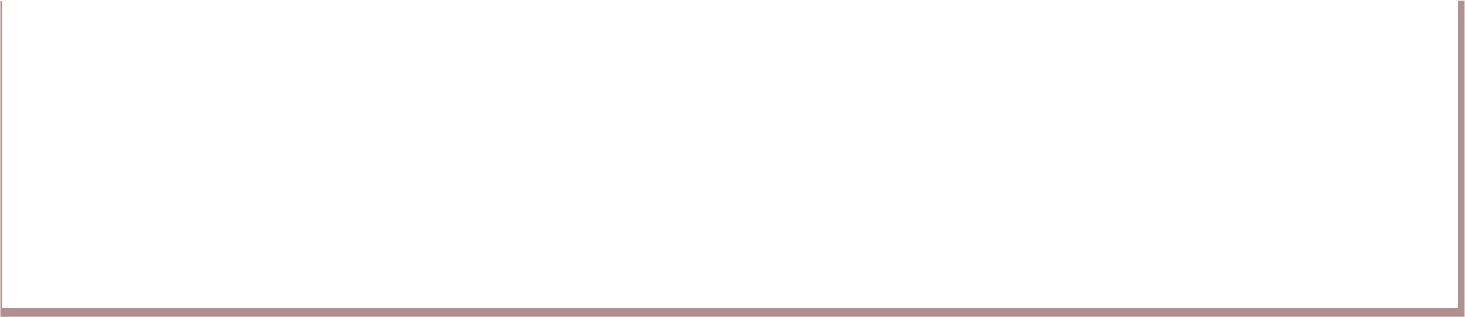
Syllabus

AFFILIATED COLLEGES

**Program Code: 36B**

**2025 – 2026 onwards**





**BHARATHIAR UNIVERSITY**

**(A State University, Accredited with “A++” Grade by NAAC, Ranked 21st among Indian Universities by MHRD-NIRF)**

**Coimbatore - 641 046, Tamil Nadu, India**

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| **Program Educational Objectives (PEOs)** | |
| The **M.Sc. Electronics and Communication System** program describe accomplishments that  graduates are expected to attain within five to seven years after graduation | |
| PEO1 | Pursue a diverse range of careers as Electronic Designers, Consultants and  Entrepreneurs. |
| PEO2 | Continue their education leading to research in interdisciplinary areas to emerge as  Competent Technologist, Experts, Educators and Scientist. |
| PEO3 | Innovate in ever changing global economic and technological environment  maintaining professional discipline and high ethical standard. |
| PEO4 | To enable graduates to acquire technical and managerial leadership positions in  their chosen fields. |
| PEO5 | Develop practical skills by providing hands-on experience to succeed in industry /  technical profession through meticulous education. |

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| **Program Specific Outcomes (PSOs)** | |
| After the successful completion of **M. Sc. Electronics and Communication System**  program, the students are expected to | |
| PSO1 | Identify user needs to provide suitable design solutions for implementing Analog  & Digital Circuits for a given specification and function. |
| PSO2 | Identify and utilize the strengths of current technologies in Raspberry Pi with Python Programming and Internet of Things with Arduino in implementing ICT  enabled services for societal needs. |
| PSO3 | Apply the core aspects of Electronics and Communication principles such as Microwave and Fiber Optics Communication, Signal Processing, Networking  Technology for designing Electronic products. |
| PSO4 | Make use of acquired technical knowledge for successful career and qualifying in  competitive examinations at the National and Global levels. |
| PSO5 | Apply the contextual knowledge of Electronics and Communication to assess  societal, environmental, health, safety, legal and cultural issues with professional ethics and function effectively as in multidisciplinary environments. |

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| **Program Outcomes (POs)** | |
| On successful completion of the **M. Sc. Electronics and Communication System** program | |
| PO1 | An ability to attain state-of-art knowledge in Electronics and Communication, to discriminate, evaluate, analyze and synthesize existing and new knowledge, and  integration of the same for enhancement of knowledge. |
| PO2 | Identify, formulate, review and analyze complex emerging electronics problems  to make intellectual knowledge for conducting research in a wider theoretical and practical. |
| PO3 | Extract information about significant problems and apply appropriate techniques,  resources, and modern electronic software tools towards contributing to the development of scientific/technological knowledge in Electronics. |
| PO4 | Comprehend Professional and ethical responsibility in Electronics and  Communication Profession. |
| PO5 | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning with enthusiasm and commitment in the  broadest context of technological change. |

# BHARATHIAR UNIVERSITY, COIMBATORE 641 046

**M.Sc., ELECTRONICS AND COMMUNICATION SYSTEMS**

**(CBCS PATTERN)**

**(Affiliated Colleges)**

*(For the students admitted from the academic year 2025-2026 onwards)*

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| **Course Code** | **Title of the Course** | **Credits** | **Hours** | | **Maximum Marks** | | |
| **Theory** | **Practical** | **CIA** | **ESE** | **Total** |
| **FIRST SEMESTER** | | | | | | | |
| 13A | PIC Microcontroller and Its Applications | 4 | 4 | - | 25 | 75 | 100 |
| 13B | Linear ICs and its Applications | 4 | 4 | - | 25 | 75 | 100 |
| 13C | Computer Communication and Networks | 4 | 4 | - | 25 | 75 | 100 |
| 13D | Instrumentation and Control Systems | 4 | 4 | - | 25 | 75 | 100 |
| - | Linear IC’s and Power Electronics Lab | - | - | 5 | - | - | - |
| - | PIC Microcontroller & Raspberry Pi with Python Programming Lab | - | - | 5 | - | - | - |
| - | Elective I: **\*** | 4 | 4 | - | 25 | 75 | 100 |
| **Total** | | **20** | **20** | **10** | **125** | **375** | **500** |
| **SECOND SEMESTER** | | | | | | | |
| 23A | Raspberry Pi with Python Programming | 4 | 4 | - | 25 | 75 | 100 |
| 23B | Power Electronics | 4 | 4 | - | 25 | 75 | 100 |
| 23C | VHDL Programming | 4 | 4 | - | 25 | 75 | 100 |
| 23D | Introduction to Industry 4.0 | 4 | 4 | - | 25 | 75 | 100 |
| 23P | Linear IC’s and Power Electronics Lab | 4 | - | 5 | 25 | 75 | 100 |
| 23Q | PIC Microcontroller & Raspberry Pi with Python Programming Lab | 4 | - | 5 | 25 | 75 | 100 |
| - | Elective II: **\*** | 4 | 4 | - | 25 | 75 | 100 |
| **Total** | | **28** | **20** | **10** | **175** | **525** | **700** |
| **THIRD SEMESTER** | | | | | | | |
| 33A | Internet of Things with Arduino | 4 | 4 | - | 25 | 75 | 100 |
| 33B | Virtual Instrumentation | 4 | 4 | - | 25 | 75 | 100 |
| 33C | Digital Signal Processing | 4 | 4 | - | 25 | 75 | 100 |
| 33D | MATLAB programming | 4 | 4 |  | 25 | 75 | 100 |
| 33 I | Summer Internship | 2 | - | - | 25 | - | 25 |
|  | Health and Wellness | 1 | - | 2 | 25 | - | 25 |

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| 33P | DSP and MATLAB  Programming Lab | 4 | - | 4 | 25 | 75 | 100 |
| 33Q | Virtual Instrumentation and VHDL Programming Lab | 4 | - | 4 | 25 | 75 | 100 |
| - | Elective III: **\*** | 4 | 4 | - | 25 | 75 | 100 |
| **Total** | | **31** | **20** | **10** | **225** | **525** | **750** |
| **FOURTH SEMESTER** | | | | | | | |
| 47V | Project Work & Viva Voce **#** | 7 | 10 | - | 50 | 150 | 200 |
| - | Elective Practical: **\*** | 4 | - | 5 | 25 | 75 | 100 |
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| **Total** | | **11** | **10** | **5** | **75** | **225** | **300** |
| **Grand Total** | | **90** | **70** | **35** | **600** | **1650** | **2250** |
| **ONLINE COURSES** | | | | | | | |
|  | SWAYAM- MOOC-Online  Course\*\* | **2** | - | - | - | - | 50 |
| Non-scholastic with Credits | | | | | |

**\* ELECTIVE SUBJECTS**

**Colleges can choose any one of the Group subjects as Electives**

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| **Course Code** | **Sem.** | **Title of the Course** |
| **GROUP - A** | | |
| 1EA | I | Web Technology |
| 2EA | II | Relational Data Base Management System |
| 3EA | III | LINUX and Shell Programming |
| 4EP | IV | RDBMS and LINUX Lab |
| **GROUP - B** | | |
| 1EB | I | Satellite and Network Communication |
| 2EB | II | Wireless Sensor Networks |
| 3EB | III | Digital Communication Techniques |
| 4EQ | IV | Digital Communication Lab |
| **GROUP - C** | | |
| 1EC | I | VLSI Design |
| 2EC | II | Low Power VLSI Design |
| 3EC | III | VLSI Design Using Verilog |
| 4ER | IV | VLSI System Design Lab |
| **GROUP - D** | | |
| 1ED | I | Foundations of Artificial Intelligence |
| 2ED | II | Machine Learning for Electronic Data Analysis |
| 3ED | III | AI for Electronic Applications |
| 4ES | IV | Virtual AI Electronics Lab |

# Summer Internship is mandatory and marks will be awarded during 3rd semester.

\*\*SWAYAM – MOOC – online course shall be of duration at least 4 weeks with at least 2 credits.

The course shall be mandatory and shall be completed within third semester (i.e., before the beginning of 4th semester).

First Semester

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| **Course code** | |  | **PIC MICROCONTROLLER AND ITS APPLICATIONS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Digital Fundamental and Basics of Microcontroller** | **Syllabus Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| To understand the Concept of PIC microcontroller Architecture and its Applications | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Learn the Architecture and Instruction set of PIC Microcontroller | | | | | | | | K1 | |
| 2 | Acquire the knowledge of Timer and Interrupt Sources | | | | | | | | K2 | |
| 3 | Gain the knowledge of different Interface and I/O ports | | | | | | | | K2 | |
| 4 | Gain the knowledge about the Special Features of PIC Microcontroller | | | | | | | | K3 | |
| 5 | Analyze the techniques of Interfacing between Processor &Peripheral devices  related to Industrial Applications | | | | | | | | K4  &K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **CPU ARCHITECTURE AND INSTRUCTION SET** | | | | **11 hours** | | | | |
| Overview -Harvard Architecture and Pipelining - Program Memory Considerations - Register  File structure and Addressing Modes - CPU Registers - Instruction set. | | | | | | | | | | |
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| **Unit:2** | | **EXTERNAL INTERRUPTS AND TIMERS** | | | | **12 hours** | | | | |
| Overview -RB0/INT External Interrupt Input - Timer0 - Compare Mode - Capture Mode - Timer1/CCP Programmable Period Scaler - Timer1 External Event Counter - Timer1 and Sleep  Mode - Pulse-Width-Modulated Outputs - PORTB-Change Interrupts. | | | | | | | | | | |
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| **Unit:3** | | **I/O PORTS AND SERIAL PORT INTERFACE** | | | **12 hours** | | | | | |
| Overview –Synchronous Serial Port Module – Serial Peripheral Interface - I2C Bus Interface –  ADC-USART | | | | | | | | | | |
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| **Unit:4** | | **SPECIAL FEATURES** | | | **11 hours** | | | | | |
| Overview - Configuration Word - -Oscillator Configurations - Reset Alternatives –Low-power  Operations -Serial Programming –Parallel Slave Port. | | | | | | | | | | |
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| **Unit:5** | | **INDUSTRIAL APPLICATIONS** | | | **12 hours** | | | | | |
| Introduction – Measurement Applications: Sensing Robot Arm Position - Optical Rotary Shaft Encoders - LVDT - Angular Speed Measurement (RPM Meter) - Digital Thermometer - RTD and Thermocouple Linearization. Automation and Control Applications: Power Controlling Devices - Thyristorised Control - Stepper Motor Drive. | | | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | | | **2 hours** | | | | | |
| Synchronous Serial Port Module | | | | | | | | | | |
|  | | **Total Lecture Hours** | | | **60 hours** | | | | | |

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| **Text Book(s)** | |
| 1 | John B.Peatman,” Design with PIC Microcontrollers”, Pearson Education, Low price  Edition, 2009 |
| 2 | Ajay V Deshmukh, " Microcontrollers: Theory and Applications" Tata McGraw-Hill  Educations,2005. |
| **Reference Books** | |
| 1 | PIC 16F87X Data book, MicrochipTechnlogy Inc, 2001. |
| 2 | [Tim Wilmshurst](https://www.amazon.com/Tim-Wilmshurst/e/B001H9XF6E/ref%3Ddp_byline_cont_book_1) " Designing Embedded Systems with PIC Microcontrollers: Principles and  Applications " Newnes, 2006 |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | <https://nptel.ac.in/courses/117/104/117104072/> |
| 2 | <https://www.watelectronics.com/pic-microcontroller-architecture-and-applications/> |
| **Course Designed By:**  Dr. K.Shanmugasundaram, Department of Electronics, SRMV College of Arts and Science, CBE Dr.A.T.Rajamanickam, Department of Electronics, Nehru Arts and Science College, Coimbatore | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | L | M | M | M |
| **CO2** | S | M | S | M | S |
| **CO3** | S | H | L | M | M |
| **CO4** | S | L | S | M | M |
| **CO5** | S | S | S | L | M |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **LINEAR IC’s AND ITS APPLICATIONS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Understanding of Electronic Circuits** | **Syllabus Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To introduce practical applications of linear integrated circuits 2. To introduce the concept of analog multiplier and Phase Locked Loop with applications 3. To study the application of ADC and DAC in real time systems | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the significance and role of the Op-Amp.in the present contemporary  world. | | | | | | | | K2 | |
| 2 | Select appropriate ICs and circuits for analog system design. | | | | | | | | K3 | |
| 3 | Design new analog linear circuit using operational amplifier. | | | | | | | | K6 | |
| 4 | Analyze and develop electronic systems using linear ICs. | | | | | | | | K4 | |
| 5 | Ability to deploy the data converters in real time scenario. | | | | | | | | K3 | |
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| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **OPERATIONAL AMPLIFIER BASICS** | | | | **11 hours** | | | | |
| Ideal Op-Amps.-Practical Op-Amps. - Internal structure – Op-Amp. Parameters - DC performance - AC performance - Interpretation of data sheets – General Op-Amp. – IC 741 Bipolar Op-Amp. – Noise – Open-loop Op-Amp Configuration – Closed-Loop Op-Amp.  Configuration – Differential Amplifier – Basic Bridge Amplifier. | | | | | | | | | | |
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| **Unit:2** | | **APPLICATIONS OF OP-AMP.** | | | | **11 hours** | | | | |
| Comparators – Schmitt Triggers – Linear half-wave rectifiers – Precision rectifiers – Peak Detectors – Sample and Hold Circuits – AC to DC converters – Voltage to Current converter – Current to Voltage converter - Dead-Zone circuits – Clippers – Clampers –Instrumentation amplifier – Integrators- Differentiators – Frequency Doubler – Voltage Divider – Square Rooter – Phase Angel Detector – Pulse  Width Modulation. | | | | | | | | | | |
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| **Unit:3** | | **FILTERS AND WAVEFORM GENERATORS** | | | **12 hours** | | | | | |
| Design of I,II order Low-pass filter - Design of I,II order High-pass filter – Band Pass Filters – Band Reject Filters – Butterworth – Chebyshev –State Variable Filters - Biquad filter - Wein bridge oscillator - Phase shift oscillator – Multivibrators - Triangular wave generators,  sawtooth wave generators. | | | | | | | | | | |
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| **Unit:4** | | **PLL AND TIMER** | | | **12 hours** | | | | | |
| Operating principles - Functional blocks of PLL - stability analysis - Lock and Capture ranges- Applications of PLL - PLL as FM detector - FSK demodulator - AM detector, Frequency translator - Phase shifter - Tracking filter - Signal synchronizer, Frequency Synthesizer. 555  Timer: Functional block diagram - terminals, modes of operation and applications. | | | | | | | | | | |

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| **Unit:5** | | **D/A AND A/D CONVERTERS** | **12 hours** |
| DAC Principles – Weighted-resistor DAC - R-2R Ladder DAC - Current output DAC, MDAC, DAC Specifications - Flash type ADC – Counter type ADC - Continuous type ADC - Successive approximation ADC - Single slope ADC, Dual slope type ADC - ADC  Specifications. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| PLL Applications | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Salivahanan S, Kanchana Bhaaskaran V S, “Linear Integrated Circuits”, McGraw Hill Education (India) Private Limited, 2015 | | |
| 2 | Robert F. Coughlin, Frederick F. Driscoll “Operational amplifiers and Linear Integrated  Circuits”, Prentice Hall, 2001. | | |
| 3 | Ramakant A.Gayakwad “Op-Amps and Linear Integrated Circuits”, Pearson, 2017 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Lal Kishore, “Linear Integrated Circuits”, Pearson, 2012 | | |
| 2 | Roy Choudhry “Linear integrated circuits”, New Age International, 1998 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://www.tutorialspoint.com/linear_integrated_circuits_applications/index.htm> | | |
| 2 | <https://nptel.ac.in/courses/108/106/108106068/> | | |
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| **Course Designed By:** Dr. P. Anbarasu, Department of Electronics, Dr. Kalaignar Govt. Arts College, Kulithalai, Karur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | M | S |
| **CO4** | S | S | S | S | S |
| **CO5** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **COMPUTER COMMUNICATION AND NETWORKS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Computer Knowledge** | **Syllabus Version** | | | | **2025- 26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Enable the students to learn the computer networks for today’s needs 2. Develop their skills in data communication and networking | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand and explain the concept of Data Communication and networks,  layered architecture and their applications | | | | | | | | K2 | |
| 2 | Analyze and Set up protocol designing issues for Communication networks. | | | | | | | | K3 | |
| 3 | Evaluate data communication link considering elementary concepts of data link  layer protocols for error detection and correction. | | | | | | | | K5 | |
| 4 | Apply various network layer techniques for designing subnets and supernets and  analyze packet flow on basis of routing protocols. | | | | | | | | K3 | |
| 5 | Understand and design application layer protocols | | | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **DATA COMMUNICATION** | | | | **11 hours** | | | | |
| Introduction – Basic terms and concepts – Line configurations – Topology – Transmission media –MODEM: Standard and types – Analog and Digital transmission: Encoding and  modulating –Channel capacity - Base band and Broad band - Transmission impairments – Multiplexing – Error Detection and control :CRC. | | | | | | | | | | |
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| **Unit:2** | | **STANDARD ARCHITECTURE AND PROTOCOLS** | | | | **11 hours** | | | | |
| Layered Architecture – OSI model –functions of layers – Data link control protocols – ARQ- Stop and wait, Sliding window, Go back N and Selective repeat– Asynchronous protocol: X Modem, Y Modem, Kermit – Synchronous protocol: BSC, SDLC, HDLC- TCP/IP model, SMTP, HTTP and FTP. | | | | | | | | | | |
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| **Unit:3** | | **NETWORK STANDARDS** | | | **12 hours** | | | | | |
| LAN: Standard, Protocol, IEEE 802 Standards – ETHERNET, LLC, MAC, CSMA/CD, Token Ring – Token bus – FDDI – ALOHA, Wireless LAN Technology, Hub, Bridge, Router, gateway, X.25.Protocols: SLIP, PPP, LCP – Optical network – SONET, WAN - MAN- Basic  Concept and standards. | | | | | | | | | | |
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| **Unit:4** | | **ISDN** | | | **12 hours** | | | | | |
| Introduction: Services – IDN – Channels – User interfaces – ISDN layers –Broad band ISDN –  Frame relay – ATM: concept and architecture – ISDN Protocol: Physical layer protocol, D- channel Data link layer and layer 3 protocols, Network signaling systems, SS7 protocol. | | | | | | | | | | |
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| **Unit:5** | | **UPPER OSI LAYERS** | **12 hours** |
| Session layer protocols, Presentation layer – Encryption / Decryption, Data security,  Encryption/Decryption, Authentication, Data compression, Application Layer Protocols – MHS, File Transfer, Virtual Terminal, CMIP. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Presentation layer – Encryption / Decryption | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Behrous A Forouzan, “Data Communication and Networking”, Tata McGraw Hill, 2013 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Gary C. Kesslar and Peter Southwick, “ISDN – Concepts, Facilities and Services”,  McGraw Hill, 1998 | | |
| 2 | William Stallings, “Data and computer communication”, Pearson Education, 2014 | | |
| 3 | Andrew S.Tanenbaum, “Computer Networks”, Pearson Education, 2018 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/106/105/106105183/> | | |
| 2 | <https://www.tutorialspoint.com/data_communication_computer_network/index.htm> | | |
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| **Course Designed By:** Dr.O.M.Saravanakumar, Department of ECS, Sri Krishna Arts and Science College, Coimbatore - 641 008 | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | M | M | S |
| **CO4** | S | S | S | S | S |
| **CO5** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **INSTRUMENTATION AND CONTROL SYSTEMS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Knowledge in Electronic Circuits** | **Syllabus Version** | | | | **2025 -26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Give basic knowledge in obtaining the open loop and closed–loop frequency responses of systems. 2. Provide the concept of stability of control system and methods of stability analysis | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand various input/output models of dynamic system | | | | | | | | K2 | |
| 2 | Analyze the stability and effect of feedback control on sensitivity | | | | | | | | K3 | |
| 3 | Understand frequency domain descriptions and dynamic analysis | | | | | | | | K2 | |
| 4 | Apply the basic methods of classical control system design such as root locus  and phase lead-lag compensation based on Bode plots | | | | | | | | K3 | |
| 5 | Understand the principles of control theory and the various components and  application of Control System | | | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **CHARACTERISTICS OF A MEASURING**  **INSTRUMENT** | | | | **11 hours** | | | | |
| Basic block diagram of Measuring instrument- static characteristics- accuracy- precision resolution- sensitivity- linearity -span and range. Dynamic characteristics: Zero order, first order  and second order instruments- characteristics- Step, ramp and impulse response. | | | | | | | | | | |
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| **Unit:2** | | **SIGNAL CONDITIONING** | | | | **12 hours** | | | | |
| Capacitive transducer- Piezo Electric-Hall effect- LVDT- Digital transducers- Fibre optic  sensors-Smart transducers- IEEE Standards1451- Introduction to LAB VIEW. | | | | | | | | | | |
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| **Unit:3** | | **BASICS OF CONTROL SYSTEMS** | | | **12 hours** | | | | | |
| Open loop and closed loop control systems- feedback characteristics- Mechanical, Electrical,  Pneumatic and Hydraulic systems-Transfer function- Block diagram reduction techniques- Signal flow graph- Mason's gain formula. | | | | | | | | | | |
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| **Unit:4** | | **STABILITY ANALYSIS IN TIME DOMAIN** | | | **12 hours** | | | | | |
| Standard inputs-time responses- specifications - concept of stability-Routh Hurwitz criteria- Root locus-construction and analysis- Lead, Lag and Lag Lead compensator using Root locus  technique. | | | | | | | | | | |
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| **Unit:5** | | **FREQUENCY DOMAIN ANALYSIS** | | | **11 hours** | | | | | |
| Bode plot-Polar plot and Nyquest plot- construction, interpretation and stability analysis-closed  loop frequency response- Lead, Lag compensator using Bode plot | | | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | | | **2 hours** | | | | | |
| Block diagram reduction techniques, Signal flow graph | | | | | | | | | | |
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|  | | **Total Lecture Hours** | | | **60 hours** | | | | | |

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| **Text Book(s)** | |
| 1 | Doeblin E O and Manik D N, " Measurement Systems",6th Edition,TMH Ltd,2011 |
| 2 | Albert D Helfric and Cooper W D,"Modern Electronic Instrumentation and Measurement  Techniques",PHI learning Edition,2017 |
| 3 | Nagrath I J and Gopal M,"Control Systems Engineering",6th Edition,New age International  Publishers,2017 |
| 4 | Benjamin C Kuo and Farid Golnaragi,"Automatic Control Systems",10th Edition, McGraw  hill,2017 |
|  | |
| **Reference Books** | |
| 1 | Renganathan S, "Transducer Engineering",Allied Publishers, 2013 |
| 2 | Katsuhiko O'Gara," Modern Control Engineering",PHI learning Pvt. Ltd,5th Edition,2015 |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | <https://nptel.ac.in/courses/108/106/108106098/> |
| 2 | <https://www.tutorialspoint.com/control_systems/index.htm> |
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| **Course Designed By:** Dr. R. Mahendran, Dept. of Electronics, Govt. Arts College, Kulithalai | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | M | M | S | S |
| **CO3** | S | S | M | M | S |
| **CO4** | S | S | S | S | S |
| **CO5** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

Second Semester

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| **Course code** | |  | **RASPBERRY PI WITH PYTHON PROGRAMMING** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and Computer programming** | **Syllabus Version** | | | | **2025 - 26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Learn the basic concepts of Python and use of various data structures and functions. 2. Understand the various components of ARM Cortex – A Series. 3. Provide the necessary knowledge of the Raspberry Pi to design and develop practical applications. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the core programming constructs of Python. | | | | | | | | K2 | |
| 2 | Express proficiency in the handling of functions in Python. | | | | | | | | K2 | |
| 3 | Understand the ARM processor design philosophy, architecture and its families. | | | | | | | | K2 | |
| 4 | Articulate the functions and features of ARM Cortex A-Series Processors. | | | | | | | | K3 | |
| 5 | Analyze and design the Raspberry Pi using Python for peripheral interfacing . | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO PYTHON** | | | | **11 hours** | | | | |
| Getting started with Python - Comments - Python Identifiers – Keywords - Variables –  Standard data types – Operators – Statement and Expression – String operations – Boolean Expressions – Control statements – Iteration statement – Input from keyboard | | | | | | | | | | |
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| **Unit:2** | | **FUNCTIONS IN PYTHON** | | | | **11 hours** | | | | |
| Built-in Functions - Composition of Functions - User Defined Functions - Parameters and  Arguments - Function Calls - The return Statement - Python Recursive Function - The Anonymous Functions - Writing Python Scripts | | | | | | | | | | |
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| **Unit:3** | | **INTRODUCTION TO ARM PROCESSOR** | | | **12 hours** | | | | | |
| The RISC Design Philosophy - The ARM Design Philosophy -Embedded System Hardware - Embedded System Software - Registers -Current Program Status Register - Pipeline - Exceptions, Interrupts, and the Vector Table - Core Extensions - Architecture Revisions - ARM  Processor Families | | | | | | | | | | |
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| **Unit:4** | | **ARM CORTEX – A SERIES** | | | **12 hours** | | | | | |
| ARM Cortex processors categories, ARMv8-A Architecture and Processors, Exception levels - Execution states, Changing Exception levels: ARMv7 processor modes - ARMv7 privilege levels, Caches: A basic cache arrangement - Cache terminology, Memory management: The memory management unit - Virtual and physical memory, big.LITTLE Technology: Structure  of a big.LITTLE system, Software execution models in big.LITTLE | | | | | | | | | | |

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| **Unit:5** | | **RASPBERY PI** | **12 hours** |
| Introduction to Raspberry Pi - Installation of NOOBS on SD Card - Installation of Raspbian on SD Card - Terminal Commands - Installation of Libraries on Raspberry Pi - Getting the Static IP Address of Raspberry Pi - Run a Program on Raspberry Pi - Installing the Remote Desktop Server - Pi Camera - Face Recognition Using Raspberry Pi - Installation of I2C Driver on Raspberry Pi - Serial Peripheral Interface with Raspberry Pi - Programming a Raspberry Pi - Play with LED and Raspberry Pi - Reading the Digital Input - Reading an Edge - Triggered  Input | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Installation of NOOBS on SD Card and Installation of Raspbian on SD Card | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Balagurusamy E, “Introduction to Computing and Problem Solving Using Python”, McGraw Hill Education (India) Private Limited, 2016 | | |
| 2 | Andrew N. Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide Designing and Optimizing System Software”, Morgan Kaufmann Publishers is an imprint  of Elsevier, 2004 | | |
| 3 | ARM® Cortex®-A Series, Programmer’s Guide for ARMv8-A, Version 1.0, ARM, 2015 | | |
| 4 | Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, "Internet  of Things with Raspberry Pi and Arduino", CRC Press, 2019 | | |
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| **Reference Books** | | | |
| 1 | Rashi Gupta, “MakingUse ofPython”, Wiley Publishing, Inc., First Edition, 2002 | | |
| 2 | Wolfram Donat, “Learn Raspberry Pi Programming with Python”, Apress, 2018 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https:/[/www.tutorialspoint.com/python/index.htm](http://www.tutorialspoint.com/python/index.htm) | | |
| 2 | <https://pythonprogramming.net/introduction-raspberry-pi-tutorials/> | | |
| 3 | [https://learn.sparkfun.com/tutorials/python-programming-tutorial-getting-started-with-the-](https://learn.sparkfun.com/tutorials/python-programming-tutorial-getting-started-with-the-raspberry-pi/all)  [raspberry-pi/all](https://learn.sparkfun.com/tutorials/python-programming-tutorial-getting-started-with-the-raspberry-pi/all) | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | S |
| **CO2** | S | S | S | S | S |
| **CO3** | S | M | S | S | S |
| **CO4** | S | M | S | S | S |
| CO5 | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **POWER ELECTRONICS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge in Semiconductor Devices** | **Syllabus Version** | | | | **2025 - 26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Impart knowledge on the switching behavior of power semiconductor devices. 2. Provide students a clear understanding of power controlled rectifiers, choppers and inverters. 3. Equip the students to develop power electronics systems for domestic and industrial applications. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of this course, student will be able to: | | | | | | | | | | |
| 1 | Remember the construction and characteristics of power electronics devices. | | | | | | | | K1 | |
| 2 | Understand the single-phase and three-phase controlled AC-to-DC converters. | | | | | | | | K2 | |
| 3 | Understand the different DC-to-DC converters. | | | | | | | | K2 | |
| 4 | Understand and acquire knowledge on the inverters. | | | | | | | | K2 | |
| 5 | Apply knowledge of power electronic circuits in various applications. | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **POWER SEMICONDUCTOR DEVICES** | | | | **13 hours** | | | | |
| Introduction to power electronics - History of power electronics - Classification of power semiconductor devices - Structure and I-V characteristics of Power Diode,Power MOSFET, IGBT, SCR, TRIAC, and GTO - Triggering methods of Thyristor - Switching characteristics of  Thyristor - Gate characteristics -Protection of Thyristor - Commutation of Thyristor | | | | | | | | | | |
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| **Unit:2** | | **PHASE CONTROLLED RECTIFIERS (AC-TO-DC CONVERTERS)** | | | | **12 hours** | | | | |
| Principle of phase control - Single-phase half-wave circuit with RL load and freewheeling diode, Single-phase half-wave circuit with RLE load - Full-wave controlled Converters - Single- phase full-wave converters: Single-phase full-wave mid-point converter, Single-phase full-wave bridge converter – Three-phase Thyristor converters: Three-phase full converters, Three-phase  semiconverters - Effect of source impedance on performance of converters - Dual Converters | | | | | | | | | | |
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| **Unit:3** | | **CHOPPERS (DC-TO-DC CONVERTERS)** | | | **12 hours** | | | | | |
| Basic Chopper classification - Basic Chopper operation: Principle of step-down Chopper (Buck Converter), Principle of step-up Chopper (Boost Converter), Principle of step-down/step-up Chopper (Buck/Boost Converter) - Control strategies - Thyristor Chopper circuits:Voltage  commutated Chopper, Current commutated Chopper, Load Commutated Chopper - Jones Chopper - Morgan Chopper - AC Chopper - Multiphase Chopper | | | | | | | | | | |
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| **Unit:4** | | **INVERTERS (DC-TO-AC CONVERTERS)** | | | **10 hours** | | | | | |
| Classification of inverters - Performance parameters of inverters - Single-phase half-bridge  voltage source inverters - Single-phase full-bridge inverters - Three-phase inverters -- Pulse- Width Modulated inverters - Voltage control of inverters - Series inverter - Parallel inverter - | | | | | | | | | | |

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| Current source inverter | | | |
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| **Unit:5** | | **APPLICATIONS OF POWER ELECTRONICS** | **11 hours** |
| Electronic timer - Alarm circuit - Ambient-light control power switch - Buck-Boost regulator - Battery charger - Sine wave inverter - Uninterrupted power supply (UPS) - Switched-mode Power Supply (SMPS) - HVDC transmission - Circuit breaker - DC motor drive - Stepper motor drive - Servo motor drive - Microcontroller-based universal motor speed control - Fuzzy logic  control of induction motor | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Microcontroller-based motor speed control & Fuzzy logic control of induction motor | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Soumitra Kumar Mandal, “Power Electronics”, McGraw Hill Education (India), 2014 | | |
| 2 | P.S. Bimbhra, “Power Electronics”, Khanna Publishers (India), 2012. | | |
| 3 | M D Singh and K B Khanchandani, “Power electronics”, TMH, 2nd Edition 2007. | | |
| 4 | Alok Jain, "Power Electronics and its Applications", Penram International Publishing, 2004 | | |
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| **Reference Books** | | | |
| 1 | Muhammad H. Rashid, “Power Electronics - Circuits, Devices and Applications”, Prentice Hall of India, 3rd Edition 2003. | | |
| 2 | Ned Mohan, Undeland and Robbins, “Power Electronics - Converters, Applications and  Design”, John Willey & sons, 3rd Edition 2003. | | |
| 3 | P.C. Sen, “Modern Power Electronics”, Wheeler Publishing Co (India), First Edition 1998. | | |
| 4 | VedamSubramanyam, “Power Electronics - Devices, Converters and Applications”, New Age International Publishers (India), 2nd Edition 2006. | | |
| 5 | Jai P.Agrawal, “Power Electronics Systems”, Pearson Education, Second Edition, 2002. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://nptel.ac.in/courses/108/105/108105066/ | | |
| 2 | https://nptel.ac.in/courses/108/102/108102145/ | | |
| 3 | https://nptel.ac.in/courses/108/107/108107128/ | | |
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| **Course Designed By:** Dr. D. Sathes Kumar, Department of ECS, Government Arts College, Ooty. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | S | M | M | M | L |
| CO2 | S | M | M | M | L |
| CO3 | S | M | M | M | L |
| CO4 | S | M | M | M | L |

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| CO5 | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | | |  | **VHDL PROGRAMMING** | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Hardware Description Programming Language with Simulation Software’s** | **Syllabus Version** | | | **2025-26** | |
| **Course Objectives:** | | | | | | | | | |
| The main Objectives of this course are to:   1. To analyze logic processes and implement logical operations using combinational logic circuits. 2. To understand concepts of modeling techniques and features of VHDL. 3. Learn hardware description language (HDL) for the specification, simulation, synthesis and implementation of digital logic systems. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Discriminate between combinatorial and sequential circuits | | | | | | | K2 | |
| 2 | Define and describe digital design flows for system design and recognize in  different approaches. | | | | | | | K3 | |
| 3 | Understanding the Synthesis and Simulation Process of Code | | | | | | | K4 | |
| 4 | Building Simulation Module as per System Specification | | | | | | | K4 | |
| 5 | Understand Programming using FPGA/CPLD concept | | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **UNIT: 1** | | **INTRODUCTION AND BASIC CONCEPTS OF VHDL** | | | | | **11 hours** | | |
| History of VHDL – Capabilities of VHDL – Hardware Abstraction – Basic Terminology –  Entity Declaration – Architecture Body Declaration – Basic Language Elements – Identifiers – Data Objects – Data Types – Operators. | | | | | | | | | |
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| **UNIT: 2** | | **MODELING TECHNIQUES - BEHAVIORAL MODELING** | | | | | **12 hours** | | |
| Entity Declaration – Architecture Declaration – Process Statements – Variable Assignment Statements – Signal Assignment Statement – Wait Statement – If Statement – Case Statement –  Null Statement – Loop Statement – Exit Statement – Next Statement – Assertion Statement – Report Statement – Multiple Process – Postponed Process. | | | | | | | | | |
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| **UNIT: 3** | | **DATA FLOW AND STRUCTURAL MODELING** | | | | | **12 hours** | | |
| DATA FLOW MODELING: Concurrent Signal Assignment Statement – Delta Delay Revisited – Multiple Drivers – Conditional Signal Assignment Statement – Selected Signal Assignment Statement – Block Statement – Concurrent Assertion Statement – Value of a Signal.  STRUCTURAL MODELING: Component Declaration – Component Instantiation – Resolving Signal Value – Examples – Half Adder – Full Adder – 4 To 1 Multiplexer – Decoder And | | | | | | | | | |

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| Encoders. | | | |
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| **UNIT: 4** | | **ADVANCED FEATURES IN VHDL** | **12 hours** |
| Generics – Configuration Specification – Configuration Declaration – Default Rules and Conversion Functions – Direct Instantiation – Incremental Binding – Subprograms – Subprogram and Operator Overloading – Signatures – Default Value of Parameters – Package Declaration – Package Body – Design File and Libraries – Order of Analysis – Implicit and  Explicit Visibilities – Attributes in VHDL. | | | |
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| **UNIT: 5** | | **DESIGN OF FPGA’S AND CPLD** | **11 hours** |
| State Machine Chart – Programmable Logic Array – Programmable Logic Array Devices – Altera Max 7000 CPLD’s – Xilinx xc 4000 Structures – Xilinx Interconnection – Xilinx Logic –  Xilinx 3000 series FPGA’s – Altera Complex Programmable Logic Devices – Altera flex 10 k series CPLD’s. | | | |
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| **UNIT: 6** | | **Contemporary Issues** | **2 hours** |
| Design concepts of FPGA’S and CPLD | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | J. Bhasker, “A VHDL Primer”, Prentice Hall PTR, Third Edition, 1999. | | |
| 2 | Charles H. Roth, Jr., Lizy K. John, “Digital Systems Design Using VHDL”, Cengage  Learning, 2016. | | |
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| **Reference Book(s)** | | | |
| 1 | Gaganpreet Kaur, “VHDL: Basics to Programming”, Pearson Education India, 2011. | | |
| 2 | Navabi, “VHDL: Modular Design and Synthesis of Cores and Systems”, Tata McGraw-Hill  Publishing Company Limited, 2008. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://swayam.gov.in/nd1\_noc19\_cs73/preview | | |
| 2 | https://nptel.ac.in/courses/106/102/106102181/ | | |
| 3 | https://nptel.ac.in/content/storage2/courses/117108040/downloads/VHDL.pdf | | |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | | | |

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | M | S | S |
| **CO4** | M | S | S | S | S |
| **CO5** | S | S | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **INTRODUCTION TO INDUSTRY 4.0** | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Mathematics, Programming & Automation knowledge is Essential** | **Syllabus Version** | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. To know the automated learning techniques. 2. To study the techniques of knowledge representation. | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Understand the representation of knowledge | | | | | | K2 | |
| 2 | Understand machine learning, AI and RPA techniques in developing real world  applications. | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
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| **Unit:1** | | **INDUSTRY 4.0** | | | **12 hours** | | | |
| Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of  Things - Cyber Security – Cloud – Augmented Reality. | | | | | | | | |
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| **Unit:2** | | **MACHINE LEARNING** | | | **12 hours** | | | |
| Machine Learning - Introduction – Definition – Types of Machine Learning –Supervised,  Unsupervised, Reinforcement Learning – Algorithms for Machine Learning – Problems solved by Machine Learning - Tools for Machine Learning - Applications areas of Machine Learning. | | | | | | | | |
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| **Unit:3** | | **ARTIFICIAL INTELLIGENCE** | | | **12 hours** | | | |
| Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - environment - Societal Influences of AI - Application Domains and Tools - Associated  Technologies of AI - Future Prospects of AI - Challenges of AI | | | | | | | | |
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| **Unit:4** | | **ROBOTIC PROCESS AUTOMATION (RPA)** | | | **12 hours** | | | |
| Robotic Process Automation (RPA): Introduction to RPA – Need for automation – Programming  constructs in RPA – Robots and Softbots – RPA architecture and process methodologies - Industries best suited for RPA - Risks & Challenges with RPA. | | | | | | | | |
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| **Unit:5** | | **APPLICATIONS AND TOOLS OF INDUSTRY 4.0** | | | **10 hours** | | | |
| Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People. Tools for Artificial Intelligence, Big Data and Data Analytics,  Virtual Reality, Augmented Reality, IoT, Robotics. | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | | | **2 hours** | | | |
| Applications of Industrial Automation Systems using Machine Learning & Artificial Intelligence | | | | | | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | P. Kaliraj, T. Devi, Higher Education for Industry 4.0 and Transformation to Education 5.0,  2020 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Stuart J. Russell, Peter Norvig, “Artificial Intelligence - A Modern Approach”, Third  Edition, Pearson Publishers, 2015 | | |
| 2 | S.N. Sivanandam, S.N. Deepa, “Principles of Soft Computing”, Second Edition, Wiley-  India, 2007 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/106/105/106105195/> | | |
| 2 | <https://nptel.ac.in/courses/106/106/106106139/> | | |
| 3 | <https://nptel.ac.in/courses/106/105/106105077/> | | |
| 4 | <https://nptel.ac.in/courses/112/101/112101098/> | | |
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| **Course Designed By:** Dr.J.Vijayakumar, Department of Electronics and Instrumentation,  Bharathiar University, Coimbatore | | | |

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **LINEAR IC’S AND POWER ELECTRONICS LAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **-** | | **-** | | **5** | **4** |
| **Pre-requisite** | | | **Basic Concepts in Electronics** | **Syllabus**  **Version** | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To inculcate experimental skills to test basic of Linear ICs and Power Electronics 2. To learn circuits using OPAMP, PLL and Timer ICs | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Design Oscillators and Filters using op-amp. | | | | | | | K6 | |
| 2 | Analyze circuits using PLL, OPAMP and timer ICs | | | | | | | K4 | |
| 3 | Analyze power amplifier circuits | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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|  | | **List of Experiments (Any 20 Experiments)** | | | **150 Hours** | | | | |
| 1. Op-Amp Characteristics. 2. V to I & I to V Convertors. 3. Half Wave Rectifier and Full Wave Rectifier Using Op-Amps. 4. Integrator and Differentiator Using Op-Amps. 5. Design of Low Pass and High Pass Filters. 6. Design of Band Pass, Band Reject & Notch Filters. 7. Instrumentation Amplifier 8. Triangular & Saw Tooth Wave Generators using Op-Amps. 9. Square Wave Generator & Schmitt Trigger Using Op-Amps. 10. Hartley & Colpitts Oscillator using Op-Amps. 11. Phase Shift and Wein Bridge Oscillator using Op-Amps. 12. Astable and Monostable Multi-Vibrators using 555. 13. Voltage Controlled Oscillator using 566. 14. Any Two Applications using Ic565 15. Function Generator using 8038. 16. Dual Power Supply using 78xx and 79xx 17. Adjustable Positive and Negative Voltage Regulator using LM 317 & LM337 18. Low and High Voltage Regulator using LM 723 19. AC Power Control using Thyristors. | | | | | | | | | |

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| 1. Switching Circuits For TRIAC. 2. Thyristor Chopper. 3. Single Phase Invertor (20W) 4. Power Amplifier Using LM 380. 5. Different Trigerring Circuits for Thyristor. 6. Study a Firing Circuit Suitable for Single Phase Half Controlled Convertor. 7. Single Phase Half Controlled Bridge Convertor with Two Thyristors & Two Diodes. 8. Single Phase Fully Controlled Bridge Convertor using Four Thyristors. 9. Pspice Simulation of DC to DC Step Down Chopper. | | |
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|  | **Total Practical Hours** | **150 hours** |
| **Course Designed By:** Dr. N. Om Muruga, Department of ECS, Government Arts College, Ooty. | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | M | S |
| **CO2** | S | S | S | S | S |
| **CO3** | S | M | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **PIC MICROCONTROLLER & RASPBERRY PI WITH PYTHON PROGRAMMING LAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **-** | | **-** | | **5** | **4** |
| **Pre-requisite** | | | **Basic Concepts in Electronics** | **Syllabus Version** | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Provide the knowledge of PIC microcontroller and Raspberry Pi based system design 2. Interfaces different motors and create Automation system 3. Design the system that interact with environment and communicate over the internet | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Design PIC microcontroller and Rapberry Pi based system | | | | | | | K6 | |
| 2 | Interface microcontroller-based system to real world | | | | | | | K4 | |
| 3 | Acquire the knowledge, techniques and skill to integrate hardware and  software | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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|  | | **List of Experiments (Any 10 Experiments)** | | | **75 hours** | | | | |
| **PIC Microcontroller**   1. Addition and Subtraction of Two 8-bit Numbers 2. Multiplication and Division of Two 8-bit numbers 3. Largest Number in an Array 4. Ascending Order of an Array 5. 4-bit Binary Counter 6. Flashing of LED 7. Seven Segment Display Interface 8. LCD Interface 9. DC Motor Direction Controller 10. Stepper Motor Interface 11. Servo Motor Control using PWM 12. Data Transfer using USART 13. SPI Communication | | | | | | | | | |

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|  | | **List of Experiments**  **(Any 10 Experiments)** | **75 hours** | |
| **Raspberry Pi with Python Programming**   1. Addition and Subtraction of Two 8-bit Numbers 2. Multiplication and Division of Two 8-bit numbers 3. Largest Number in an Array 4. Ascending Order of an Array 5. 4-bit Binary Counter 6. Flashing of LED 7. Seven Segment Display Interface 8. PIR sensor interface 9. Interfacing DC Motor 10. Stepper Motor Interface 11. Pulse Width Modulation 12. Interfacing of Relay 13. Remote-controlling of Electronic Device through Web Interface | | | | |
|  | **Total Practical Hours** | | | **150 hours** |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode. | | | | |

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | M | S |
| **CO2** | S | S | S | S | S |
| **CO3** | S | M | S | M | M |

\*S-Strong; M-Medium; L-Low

Third Semester

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| **Course code** | |  | **INTERNET OF THINGS WITH ARDUINO** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and Computer programming** | **Syllabus Version** | | | | **2025 -26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Learn the basic principles of various smart sensors and apply it in IoT applications 2. Train the students to build IoT systems using sensors, single board computers and open source IoT platforms. 3. Make the students to apply IoT data for real time applications in various domain in secured manner. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the concepts on sensing devices, actuation, processing and  communications | | | | | | | | K2 | |
| 2 | Implement the Sensors based system using Arduino | | | | | | | | K3 | |
| 3 | Understand the key technologies, protocols and standards in Internet of Things. | | | | | | | | K2 | |
| 4 | Apply the wireless technologies for IoT using ESP8266 | | | | | | | | K3 | |
| 5 | Illustrate the applications of IoT in real time scenario | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **SENSORS AND ACTUATORS** | | | | **11 hours** | | | | |
| Sensors Classification - Working Principle of Sensors - Criteria to Choose a Sensor - Generation  of Sensors - Resistance sensor – Voltage sensor – Current sensor - PIR Proximity sensor - Barometric pressure sensor – Gyroscope - DC motor - Servo motor- Stepper motor | | | | | | | | | | |
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| **Unit:2** | | **ARDUINO** | | | | **12 hours** | | | | |
| Introduction to Ardunio – Arduino family of boards with Pin description – Installation of Arduino IDE – Basic Commands for Arduino – LCD Commands – Serial Communication Commands – Interface LED with Arduino – Interface LCD with Arduino - Interface PIR sensor  with Arduino – Interface LDR with Arduino – Interface with Bluetooth module. | | | | | | | | | | |
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| **Unit:3** | | **INTRODUCTION TO IoT** | | | **11 hours** | | | | | |
| Characteristics of IoT – Design Principles of IoT – IoT Architecture and Protocols – IoT Levels  - IoT vs M2M - Design Methodology - Challenges in IoT Design – IoT system management - IoT Cloud platforms: Temboo; SensorCloud; ThingWorx; ThingSpeak; Blynk; Cayenne from myDevices | | | | | | | | | | |
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| **Unit:4** | | **DATA OVER IoT** | | | **12 hours** | | | | | |
| ESP8266 module: Hardware requirements - Installing the Arduino IDE for the ESP8266 - Connecting your module to your Wi-Fi network - Controlling an LED - Reading data from a GPIO pin - Reading data from a digital sensor - Configuring the ESP8266 module and  controlling an LED - Controlling the LED from a cloud dashboard - Controlling the lamp from | | | | | | | | | | |

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| anywhere in the world – Monitoring temperature and Humidity using DHT11 | | | |
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| **Unit:5** | | **SMART USE OF IoT** | **12 hours** |
| Smart Home - Wearables – Connected Cars – Industrial IoT Applications – Smart Cities – IoT  in Agriculture – IoT Applications in Retail – Energy Engagement – IoT in Healthcare. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Interfacing with ARDUINO | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, and Mahendra Swain,  “Internet of things with Raspberry pi and Arduino”, CRC Press Taylor & Francis Group 2020. | | |
| 2 | Volker Ziemann, A Hands-On Course in Sensors Using the Arduino and Raspberry Pi,  CRC Press, Taylor & Francis Group, 2018 | | |
| 3 | Marco Schwartz, Internet of Things with ESP8266, Packt Publishing, 2016 | | |
| 4 | Mohammad Ali Jabraeil Jamali, Bahareh Bahrami, Arash Heidari, Parisa Allahverdizadeh, Farhad Norouzi, Towards the Internet of Things Architectures, Security, and Applications, Springer Nature Switzerland AG, 2020 | | |
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| **Reference Books** | | | |
| 1 | Ashwin Pajankar, Arduino Made Simple, BPB Publications, First Edition, 2018 | | |
| 2 | Pethuru Raj, Anupama C. Raman, The Internet of Things Enabling Technologies, Platforms,  and Use Cases, CRC Press, Taylor & Francis Group, 2017 | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://www.arduino.cc/en/IoT/HomePage> | | |
| 2 | <https://swayam.gov.in/nd2_arp19_ap52/preview> | | |
| 3 | <https://opensource.com/article/17/12/how-build-custom-iot-hardware-arduino> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | S |
| **CO2** | S | S | S | S | S |
| **CO3** | S | M | S | S | S |
| **CO4** | S | M | S | S | S |
| CO5 | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **VIRTUAL INSTRUMENTATION** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Instrumentation** | **Syllabus Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Know the basic concepts of virtual Instrumentation 2. Learn the concepts of Data Acquisition, signal Processing and Manipulation | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the concepts of virtual Instruments and enhance programming skills  in LABVIEW | | | | | | | | K2 | |
| 2 | Understand the fundamentals of Virtual Instrumentation and data Acquisition. | | | | | | | | K2 | |
| 3 | Apply the theoretical concepts to realize practical systems | | | | | | | | K3 | |
| 4 | Analyze and evaluate the performance of Virtual Instrumentation Systems. | | | | | | | | K5 | |
| 5 | Create a VI system to solve real time problems using data acquisition. | | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION** | | | | **11 hours** | | | | |
| General functional description of a digital instrument - Block diagram of a Virtual Instrument - Physical quantities and Analog interfaces - Hardware and Software - User interfaces - Advantages of Virtual instruments over conventional instruments - Architecture of a Virtual  instrument and its relation to the operating system. | | | | | | | | | | |
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| **Unit:2** | | **SOFTWARE OVERVIEW** | | | | **11 hours** | | | | |
| Lab VIEW - Graphical user interfaces - Controls and Indicators - 'G' programming - Labels and Text - Shape, Size and Color - Owned and free labels - Data type, Format, Precision and representation - Data types - Data flow programming - Editing - Debugging and Running a Virtual instrument - Graphical programming palettes and tools - Front panel objects - Functions  and Libraries. | | | | | | | | | | |
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| **Unit:3** | | **PROGRAMMING STRUCTURE** | | | **12 hours** | | | | | |
| FOR loops, WHILE loops, CASE structure, formula nodes, Sequence structures - Arrays and Clusters - Array operations - Bundle - Bundle/Unbundle by name, graphs and charts - String and file I/O - High level and Low level file I/O's - Attribute modes Local and Global variables. **OPERATING SYSTEM AND HARDWARE OVERVIEW:** PC architecture, current trends, Operating system requirements, Drivers – Interface Buses – PCI Bus – Interface cards –  specification – Analog and Digital interfaces – Power, Speed and timing considerations. | | | | | | | | | | |
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| **Unit:4** | | **HARDWARE ASPECTS** | | | **12 hours** | | | | | |
| Installing hardware, Installing drivers - Configuring the hardware - Addressing the hardware in  LabVIEW - Digital and Analog I/O function - Data Acquisition - Buffered I/O - Real time Data | | | | | | | | | | |

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| Acquisition. | | | |
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| **Unit:5** | | **LABVIEW APPLICATIONS** | **12 hours** |
| IMAQ - Motion Control: General Applications - Feedback devices, Motor Drives – Instrument Connectivity - GPIB, Serial Communication - General, GPIB Hardware & Software  specifications - PX1 / PC1: Controller and Chassis Configuration and Installation. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| PC architecture, current trends and Operating system requirements | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Garry M Johnson, "Labview Graphical Programming", Tata McGraw Hill, New Delhi,2006. | | |
| 2 | Robert H.Bishop,”Learning with Lab-View” Prentice Hall, 2014 | | |
| 3 | Labview : Basics I & II Manual, National Instruments, 2005. | | |
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| **Reference Books** | | | |
| 1 | Lisa K Wells, "Labview for Everyone", Prentice Hall of India, New Delhi, 2009. | | |
| 2 | Barry Paron, "Sensor, Transducers and Labview", Prentice Hall, New Delhi, 2000 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://www.ni.com/getting-started/labview-basics/> | | |
| 2 | [https://www.electronics-notes.com/articles/test-methods/labview/vis-virtual-](https://www.electronics-notes.com/articles/test-methods/labview/vis-virtual-instruments.php)  [instruments.php](https://www.electronics-notes.com/articles/test-methods/labview/vis-virtual-instruments.php) | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | S |
| **CO2** | S | S | S | S | S |
| **CO3** | S | M | S | S | S |
| **CO4** | S | M | S | S | S |
| CO5 | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **DIGITAL SIGNAL PROCESSING** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Signals and System** | **Syllabus**  **Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To introduce signals, systems, time and frequency domain concepts, and DSP techniques 2. To acquire the knowledge of design, implementation, analysis and comparison of digital filters for processing of discrete time signals. 3. To program DSP Processor for various applications | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understanding the fundamentals of discrete time signals and systems | | | | | | | | K2 | |
| 2 | Know the computational algorithms and properties of the DFT in DSP system design | | | | | | | | K1 | |
| 3 | Evaluate design problems related to frequency selective processing and design FIR/IIR filters | | | | | | | | K5 | |
| 4 | Create a knowledge about Programmable digital signal processor | | | | | | | | K6 | |
| 5 | Familiar with programming environment used to develop TMS320C54XX  processor applications. | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **BASICS OF SIGNALS AND SYSTEMS** | | | | **10 hours** | | | | |
| Introduction to Signals - System and Signal processing - Classification of Signals - representation of signals - Standard discrete time signals - Classification of Discrete time signals -Operation on signals - Classification of Discrete time systems - Interconnection of systems - Convolution and  correlation - Sampling and quantization. | | | | | | | | | | |
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| **Unit:2** | | **COMPUTATION OF DISCRETE FOURIER TRANSFORMS** | | | | **13 hours** | | | | |
| Introduction - Direct evaluation of DFT - Fast Fourier transform (FFT) - Decimation-in-time algorithm(DIT) - Radix-2 DIT-FFT algorithm steps - Decimation-in-frequency algorithm(DIF) - Radix-2 DIF-FFT algorithm steps - Differences and similarities of DIT and DIF algorithm -  IDFT using FFT algorithm. | | | | | | | | | | |
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| **Unit:3** | | **SYSTEM STRUCTURES AND FILTERS DESIGN** | | | **13 hours** | | | | | |
| Introduction: Block diagram and signal flow graph representation, **IIR system**: Direct, Canonic, Cascade and Parallel form, **FIR system**: Direct, Canonic, Cascade and Lattice structure. **IIR Filters:** Impulse invariant technique, Bilinear transformations. **FIR Filters:** Windowing method  using Kaiser Window, Frequency sampling method. | | | | | | | | | | |
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| **Unit:4** | | **DIGITAL SIGNAL PROCESSOR** | | | **10 hours** | | | | | |
| Multiplier and multiplier accumulator(MAC) -Bus structure & memory access scheme – Multiple | | | | | | | | | | |

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| access memory- Multiported memory - VLIW architecture – Pipelining - Special addressing  modes in P-DSP’s -On Chip Peripherals | | | |
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| **Unit:5** | | **TMS320C5X PROCESSOR PROGRAMMING AND**  **APPLICATIONS** | **12 hours** |
| TMS 320C5x Architecture: CALU - ARAU - PLU – Program control - Status registers- Assembly  language syntax – Instruction set - Addressing modes - Applications | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| TMS 320C5416 Architecture - Instruction set – Applications | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | P. Ramesh babu, **“**Digital Signal Processing**”**, SciTech Publication, 2011 | | |
| 2 | B.Venkataramani and M.Bhaskar, “Digital Signal Processors-Architecture, Programming and Applications**’’,** Tata McGraw Hill,2004 | | |
| 3 | TMS 320C5X - Users guide, Texas instruments,1998 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Salivaghan,Vallavaraj, “Digital Signal Processing”, Tata McGraw Hill,2003 | | |
| 2 | John G.Proakis, Dimitris G. Manolakis, D.Sharma**, “**Digital Signal Processing Principles,  Algorithms, and Applications**”** – Pearson Education, 2014. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://www.my-mooc.com/en/mooc/dsp/> | | |
| 2 | <https://swayam.gov.in/nd1_noc19_ee50/preview> | | |
| 3 | <https://nptel.ac.in/courses/117/102/117102060/> | | |
| 4 | <https://www.ti.com/lit/ug/spru056d/spru056d.pdf> | | |
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| **Course Designed By:** Mrs.S.Sangeethavanathi, Dept. of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | M | M |
| **CO2** | M | M | S | M | S |
| **CO3** | S | S | M | S | S |
| **CO4** | M | S | M | S | S |
| **CO5** | S | M | S | M | M |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **MATLAB PROGRAMMING** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **High-level programming language, Signals**  **and Systems, Advanced Mathematics** | **Syllabus**  **Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce MATLAB computing environment. 2. Provide students a basic understanding of MATLAB, including vector and matrix operations, input-output statements, graphics and control structures. 3. Enable students to use MATLAB for signal processing and image processing applications. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of this course, student will be able to: | | | | | | | | | | |
| 1 | Become familiar with fundamental operations in MATLAB. | | | | | | | | K2 | |
| 2 | Understand MATLAB programming techniques including input-output  statements, MATLAB graphics and control structures. | | | | | | | | K2 | |
| 3 | Program scripts using the MATLAB development environment to solve  scientific and mathematical problems. | | | | | | | | K3 | |
| 4 | Acquire a reasonable level of competence in MATLAB programming for signal  processing. | | | | | | | | K3 | |
| 5 | Apply MATLAB to solve image processing problems. | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
|  | | | | | | | | | | |
| **Unit:1** | | **INTRODUCTION TO MATLAB** | | | | **11 hours** | | | | |
| MATLAB environment – Help feature – Types of files – Platform – Search path – MATLAB  commands –Character set – Data types – Constants and Variables – Operators – Hierarchy of operators – Built-in functions – Assignment statement | | | | | | | | | | |
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| **Unit:2** | | **VECTORS AND MATRICES** | | | | **11 hours** | | | | |
| Scalars and vectors – Entering data in matrices – Line continuation – Matrix subscripts/indices –  Multi-dimensional matrices and arrays – Matrix manipulations – Generation of special matrices –Matrix and array operations – Functions with array inputs – Structure arrays – Cell arrays | | | | | | | | | | |
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| **Unit:3** | | **INPUT-OUTPUT STATEMENTS, MATLAB GRAPHICS AND CONTROL STRUCTURES** | | | **12 hours** | | | | | |
| Input-Output statements: Data input – Interactive inputs – Reading/Storing file data – Output commands – Low level input-output functions – MATLAB graphics: Two-dimensional plots – Multiple plots – Style options – legend command - Sub plots – Specialized two-dimensional  plots – Three-dimensional plots - Control structures: Loops – Branches control structures | | | | | | | | | | |
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| **Unit:4** | | **MATLAB PROGRAMMING FOR SIGNAL**  **PROCESSING** | | | **12 hours** | | | | | |
| Representation of basic signals - Discrete convolution - Discrete correlation - Sampling theorem  - Fast Fourier transform - Butterworth analog filters (low-pass filter) - Butterworth digital IIR filters (low-pass filter) - IIR filter design using impulse invariant method - IIR filter design using bilinear transformation method - FIR filter design using rectangular window technique | | | | | | | | | | |
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| **Unit:5** | | **MATLAB PROGRAMMING FOR IMAGE PROCESSING** | **12 hours** |
| Images in MATLAB: Reading, writing and querying images - Basic display of images - Accessing pixel values - Converting image types - Arithmetic operations on images: Image addition and subtraction , Image multiplication and division - Logical operations on image – Thresholding - Point-based operations on images: Logarithmic transform, Exponential transform, Power-law (gamma) transform - Pixel distributions: Histograms, Adaptive thresholding, Contrast stretching, Histogram equalization - Filtering for noise removal: Mean  filtering, Median filtering, Gaussian filtering - Image restoration by inverse filtering | | | |
|  | | | |
| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Filtering for noise removal | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Books** | | | |
| 1 | Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, "MATLAB and its application in Engineering", Pearson Education India, 2009. | | |
| 2 | S. Salivahanan, A. Vallavaraj, "Digital Signal Processing", Tata McGraw-Hill Education, 2001. | | |
| 3 | Chris Solomon, Toby Breckon, "Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab", Wiley-Blackwell, 2011. | | |
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| **Reference Books** | | | |
| 1 | Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage Learning, 2007.. | | |
| 2 | https:/[/www.mathworks.com/help/pdf\_doc/matlab/getstart.pdf](http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf) | | |
| 3 | Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using  MATLAB, Second Edition, Tata McGraw Hill Education Private Limited, 2010. | | |
| 4 | Attaway, Stormy, “MATLAB: A Practical Introduction to Programming and Problem  Solving”, Elsevier Science, 2017. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://ocw.mit.edu/courses/mathematics/18-s997-introduction-to-matlab-programming-fall-  2011/ | | |
| 2 | https:/[/www.coursera.org/learn/matlab](http://www.coursera.org/learn/matlab) | | |
| 3 | https://nptel.ac.in/courses/103/106/103106118/ | | |
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| **Course Designed by:** Dr. T. Veeramanikandasamy, Department of Electronics and  Communication System, Sri Krishna Arts and Science College, Coimbatore 641008. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | S | M | S | M | L |
| CO2 | S | M | S | M | L |
| CO3 | S | M | S | M | L |
| CO4 | S | S | S | M | S |
| CO5 | S | S | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | | |  | **HEALTH AND WELLNESS** | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | | **2** | | **0**  **2025-2026** | | **0** | **1** |
| **Pre-requisite** | | | | **Physical Fitness, Nutrition, Mental Health, Awareness on Drug addiction and its effects** | **Syllabus**  **Version** | | | |  | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main Objectives of this course are to:  The Health & Wellness course focuses on teaching the elements of physical, mental, emotional, social, intellectual, environmental well-being which are essential for overall development of an individual. The course also addresses the dangers of substance abuse and online risks to promote emotional and mental health. | | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | Demonstrate proficiency in sports training and physical fitness practices. | | | | | | | | K2 | | |
| 2 | Improve their mental and emotional well-being, fostering a positive outlook on health and life. | | | | | | | | K2 | | |
| 3 | Develop competence and commitment as professionals in the field of health and wellness. | | | | | | | | K2 | | |
| 4 | Awareness on drug addiction and its ill effects | | | | | | | | K3 | | |
| 5 | Understand and adopt balanced nutritional practices and lifestyle choices to promote long-term personal and community health | | | | | | | | K3 | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **UNIT: 1** | | **INTRODUCTION TO HEALTH AND WELLNESS** | | | | | **6 hours** | | | | |
| Dimensions of Well-being - Wellness Wheel - Bad Habits Awareness - Tech Tools for Wellness - Hygiene and Grooming | | | | | | | | | | | |
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| **UNIT: 2** | | **PHYSICAL AND EMOTIONAL FITNESS** | | | | | **6 hours** | | | | |
| Types of Fitness - Basics of Nutrition - Yoga and Breathing - Stress Management - Body Positivity | | | | | | | | | | | |
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| **UNIT: 3** | | **SOCIAL AND DIGITAL WELLNESS** | | | | | **6 hours** | | | | |
| Gratitude and Kindness - Forgiveness Practice - Respecting Differences - Digital Detox - Online Safety | | | | | | | | | | | |
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| **UNIT: 4** | | **MENTAL AND ENVIRONMENTAL HEALTH** | | | | | **6 hours** | | | | | |
| Self-Reflection - Mindfulness Practice - Connecting with Nature - Creative Expression - Eco-Friendly Actions | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| **UNIT: 5** | | **LIFE SKILLS AND ADDICTION AWARENESS** | | | | | **6 hours** | | | | | |
| First-Aid Basics - CPR Awareness - Cyber Awareness - Addiction Effects - Seeking Help | | | | | | | | | | | | |
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|  | | **Total Lecture Hours** | | | | | **30 hours** | | | | | |

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| **Reference Book(s)** | |
| 1 | Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell. |
| 2 | Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021. |
| 3 | Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve WellBeing by Nashay Lorick, 2022 |
| 4 | Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018. |
|  | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | |
| 1 | https://www.un.org/sustainabledevelopment/health/ |
| 2 | https://healthlibrary.stanford.edu/books-resources/mindfulnessmeditation.html |
| 3 | https://positivepsychology.com/social-wellbeing/ |
| 4 | https://www.lorman.com/blog/post/how-to-keep-your-brain-sharp |
| 5 | https://www.verywellmind.com/how-your-environment-affects-your-mentalhealth-5093687 |
| 6 | https://www.betterup.com/blog/how-to-say-no |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | |

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| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | M | S | S | S | M |
| **CO2** | S | S | M | M | S |
| **CO3** | S | S | S | S | M |
| **CO4** | S | M | S | S | S |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **DSP AND MATLAB PROGRAMMING LAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core Practical** | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | **Elementary knowledge of computer**  **programming and understanding of basic mathematics** | **Syllabus Version** | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Provide an exposure to the specific application areas like digital signal processing and digital image processing. 2. Impart practical working knowledge on a very powerful technical programming language MATLAB used by scientific, engineering and non-engineering community. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of this course, student will be able to: | | | | | | | | | |
| 1 | Understand the basic concepts of digital signal processing and to enable their  usage in the higher learning. | | | | | | | K2 | |
| 2 | Use MATLAB development environment for the verification of mathematical  functions. | | | | | | | K3 | |
| 3 | Implement MATLAB algorithms for the fundamental image processing  applications. | | | | | | | K3 | |
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| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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|  | | **List of Experiments (Any 6 Experiments)** | | | **30 hours** | | | | |
| **Using Digital Signal Processor**   1. Arithmetic operations 2. Generation of basic continuous-time signals 3. Generation of basic discrete-time signals 4. Study the signal operations performed on independent variable (time) 5. Solving difference equations 6. Study the linearity property of systems 7. Study the time invariance property of systems 8. Discrete Convolution of signals 9. Discrete Correlation of signals 10. Study the frequency response of discrete-time system with a Z-transform 11. Compute direct DFT (4-point) 12. Compute DFT using DIT FFT Algorithm (4-point) | | | | | | | | | |

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| 1. Design of Butterworth digital IIR Filter (Low-pass and High-pass filters) 2. Design of digital FIR filter using windowing technique (Rectangular window) | | | |
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|  | **List of Experiments (Any 6 Experiments)** | | **30 hours** |
| **MATLAB PROGRAMMING**   1. Study of basic Matrix operations 2. Solution of Linear equations 3. Determination of Eigenvalues and Eigenvectors of a square Matrix 4. Determination of Roots of a Polynomial 5. Plotting of 2D and 3D cures 6. Differentiation and Integration of a function 7. Solution of Differential equation by Euler method 8. Determination of time response of RLC circuit 9. Laplace and Inverse Laplace transform of a function 10. Image Arithmetic Operations 11. Image Sampling: Zooming and Shrinking operations 12. Basic Gray Level Transformations: Power Law and Log transforms 13. Image Contrast Enhancement by Histogram equalization technique 14. Spatial Image Filtering: Low-pass and High-pass filtering | | | |
|  | | | |
|  | **Total Practical Hours** | **60 hours** | |
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| **Course Designed By:** Dr. T. Veeramanikandasamy, Department of Electronics and Communication System, Sri Krishna Arts and Science College, Coimbatore 641008. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | S | M | M | M | S |
| CO2 | S | M | M | M | L |
| CO3 | S | M | M | M | L |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **VIRTUAL INSTRUMENTATION AND VHDL PROGRAMMING LAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | **Elementary knowledge of Instrumentation and VHDL simulation Software’s** | **Syllabus Version** | | | **2025 -26** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce the concept of virtual instrumentation and to develop basic VI programs 2. Learn knowledge about digital circuit design by VHDL programming | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Analyze and design different type of programs based on data acquisition | | | | | | | K4 | |
| 2 | Familiarize with the VI software and learn programming in VI | | | | | | | K2 | |
| 3 | Design and simulate list of combinational and sequential digital circuits using  simulation software’s - VHDL language | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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|  | | **List of Experiments (Any 6 Experiments)** | | | **30 hours** | | | | |
| **Virtual Instrumentation**   1. Creating a simple VI to place a Digital Control 2. Navigation and Editing 3. VI to make a Degree C to Degree F Converter 4. Converting VI in to Sub VI 5. Write a programme to count Modulus 32 and display the values in decimal, octal and binary. 6. Built a VI using while loop that displays random numbers in to three wave form charts. (Strip, scope & Sweep) 7. Data Acquisition using Lab VIEW 8. Development of Temperature Measurement using Lab VIEW 9. Development of Virtual Instrument for Function Generator using Lab VIEW 10. Development of Virtual Instrument for Audio Signal Spectrum Analyser using Lab VIEW | | | | | | | | | |
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|  | | **List of Experiments (Any 6 Experiments)** | | | **30 hours** | | | | |
| **VHDL PROGRAMMING LAB**   1. Simple Logic Gates 2. Half Adder and Full Adder | | | | | | | | | |

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| 1. Half Subtractor and Full Subtractor 2. Encoder and Decoder 3. Multiplexer and Demultiplexer 4. Solving Boolean Equations 5. Flip - Flops 6. Digital Counters 7. Shift Registers and Ring Counter 8. 4 bit and 8 bit Multiplier 9. Arithmetic and Logic Unit 10. Implementation of Simple Programs in CPLD or FPGA kit | | |
|  | **Total Practical Hours** | **60 hours** |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| CO1 | S | M | M | M | S |
| CO2 | S | M | M | M | L |
| CO3 | S | M | M | M | L |

\*S-Strong; M-Medium; L-Low

Elective Course

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| **Course code** | |  | **WEB TECHNOLOGY** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester I : Elective - Group-A** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Computer**  **programming** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To enable the students to learn the basics of internetworking. 2. To learn the concept of web pages. 3. To know about the internet security systems. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Apply the concept of networking method in various applications. | | | | | | | | K3 | |
| 2 | Demonstrate the internetworking standard, its architecture, advantages and limitations. | | | | | | | | K4 | |
| 3 | Design and development of web-pages and web-applications | | | | | | | | K5 | |
| 4 | Create knowledge on web pages and protocols. | | | | | | | | K6 | |
| 5 | Programming web pages with JavaScript /DOM | | | | | | | | K1 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | |  | | | | **10 hours** | | | | |
| Internetworking concepts – Devices: Repeaters – Bridges – Routers – Gateways – Internet  topology Internal Architecture of an ISP – IP Address – Basics of TCP – Features of TCP – UDP. | | | | | | | | | | |
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| **Unit:2** | |  | | | | **12 hours** | | | | |
| DNS – Email – FTP – HTTP – TELNET- Electronic commerce and Web technology– Aspects – Types – E-procurement models – Solutions – Supply chain management – Customer Relationship Management – Features Required for enabling e-commerce – Tiers – Concepts of a  Tier | | | | | | | | | | |
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| **Unit:3** | |  | | | **12 hours** | | | | | |
| Web page – Static Web pages – Dynamic Web pages – DHTML – CGI – Basics of ASP technology – Active Web pages - User Sessions: Sessions and session Management – Maintaining state information - Transaction Management: Transaction Processing monitors –  object Request Brokers – Component transaction – monitor – Enterprise Java Beans. | | | | | | | | | | |
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| **Unit:4** | |  | | | **12 hours** | | | | | |
| Security issues: Basic concepts – cryptography – Digital signature – Digital certificates –  Security Socket Layer (SSL) – Credit card Processing Models – Secure Electronic Transaction – | | | | | | | | | | |

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| 3D Secure Protocol – Electronic money. Electronic Data Interchange: Overview of EDI – Data  Exchange Standards – EDI Architecture – EDI and the Internet | | | |
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| **Unit:5** | |  | **12 hours** |
| Extensible Markup Language (XML) – Basics of XML – XML Parsers – Need for a standard–  Limitations of Mobile Devices – WAP Architecture – WAP stack – Object Technology. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Knowledge of framework and platforms- security-performance | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Achyat. S. Godbole and Atul Kahate, “Web Technologies”, Tata McGraw Hill Pub. Co,  Delhi, 2006. | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Ellote Rusty Harold, “Java Network Programming”, O’Reilly Publications, 1997. | | |
| 2 | Jason Hunter, William Crawford, “Java Servlet Programming”, O’Reilly Publications, 1998. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://swayam.gov.in/nd2_ugc19_lb05/preview> | | |
| 2 | <https://nptel.ac.in/courses/106/105/106105084/> | | |
| 3 | <https://www.scss.tcd.ie/owen.conlan/CS7062/1_Web_Technologies_Handout.pdf> | | |
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| **Course Designed By:** Mr.S.Shankar, Department of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | M | M |
| **CO2** | M | S | M | S | S |
| **CO3** | S | M | M | S | M |
| **CO4** | M | S | S | S | M |
| **CO5** | S | M | M | S | M |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **RELATIONAL DATA BASE MANAGEMENTSYSTEM** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester II : Elective - Group-A** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Computer**  **programming** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To Define basic foundational terms of Database. 2. To Compare relational model with the Structured Query Language (SQL) and also known the constraints and controversies associated with relational database model. 3. To identify the major types of relational management systems and to understand the applications. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Demonstrate the basics of query evaluation and apply query optimization  techniques. | | | | | | | | K2 | |
| 2 | Utilize the knowledge of basics of SQL and construct queries using SQL | | | | | | | | K1 | |
| 3 | Apply relational database theory, and be able to write relational algebra  expressions for queries | | | | | | | | K3 | |
| 4 | Work successfully on a team by design and development of a database  application system as part of a team | | | | | | | | K4 | |
| 5 | Use commercial relational database system (Oracle) by writing Queries using SQL and to compare the basic database storage structures and access  techniques: file and page organizations, indexing methods including B ‐tree, and hashing. | | | | | | | | K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION** | | | | **12 hours** | | | | |
| Purpose of Database systems- View of Data-Data Models-Database Languages- Transaction Management-Storage Management Database Administrator- Database Users- System Structure. ENTITY Relationship Model: Basic concepts-keys-Entity Relationship Diagram, Weak Entity sets, E-R Features. Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams - Denormalization– Another Example of Normalization. | | | | | | | | | | |
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| **Unit:2** | | **ORACLE TABLES** | | | | **11 hours** | | | | |
| DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table- Displaying Table Information – Altering an Existing Table – Dropping, Renaming, and Truncating Table. | | | | | | | | | | |
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| **Unit:3** | | **WORKING WITH TABLE: DATA MANAGEMENT**  **AND RETRIEVAL** | | | **12 hours** | | | | | |
| DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an  Existing Rows/Records -restricting Data with WHERE clause –Sorting – **Functions and** | | | | | | | | | | |

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| **Grouping**: Built-in functions –Grouping Data. | | | |
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| **Unit:4** | | **MULTIPLE TABLES** | **12 hours** |
| **Join & Set operators-** Join-set operators. **Sub queries:** Sub query-EXIST and NOT EXIST operators. **PL/SQL: A Programming Language:** Block Structure –Comments – Data Types – Variable Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. | | | |
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| **Unit:5** | | **CONTROL STRUCTURES AND EMBEDDED SQL** | **11 hours** |
| Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation in PLSQL.  **PL/SQL Cursors and Exceptions:** Cursors-Type of Cursors-Cursors Variables-Exceptions. Triggers. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Increasing data volumes- Decentralized data management- Data security | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Abraham Silberschatz, Henry F.Korth,S.Sudharson, ”Database Concepts”, Tata  McGraw Hill International Edition, 1997. | | |
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| **Reference Books** | | | |
| 1 | Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing, 2008 | | |
| 2 | Ramez Elmasri, Shamkant Navathe, “Fundamentals of Database Systems”, Pearson, 2016. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/content/storage2/courses/106106095/pdf/1_Introduction.pdf> | | |
| 2 | <https://swayam.gov.in/nd2_nou19_lb03/preview> | | |
| 3 | <https://cs.stanford.edu/people/widom/DB-mooc.html> | | |
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| **Course Designed By:** Mr.S.Shankar, Department of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | M |
| **CO2** | M | S | M | M | M |
| **CO3** | M | S | S | M | S |
| **CO4** | S | M | M | S | S |
| **CO5** | M | S | S | M | M |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **LINUX AND SHELL PROGRAMMING** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester III : Elective - Group-A** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Computer**  **Programming** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To familiarize students with the Linux environment 2. To learn the fundamentals of shell scripting/programming 3. To familiarize students with basic Linux administration | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the basic commands of Linux operating system and can write shell  scripts | | | | | | | | K2 | |
| 2 | Write shell scripts to automate various tasks | | | | | | | | K1 | |
| 3 | Master the basics of Linux administration | | | | | | | | K4 | |
| 4 | Identify and use UNIX/Linux utilities to create and manage simple file  processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks. | | | | | | | | K6 | |
| 5 | Monitor system performance and network activities. | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create | | | | | | | | | | |
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| **Unit:1** | | **WELCOME TO LINUX** | | | | **11 hours** | | | | |
| Overview of LINUX-Additional Features in LINUX .**The LINUX Operating System:**  Logging In-Working with the shell.. | | | | | | | | | | |
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| **Unit:2** | | **LINUX SYSTEM START UP & SHUTDOWN** | | | | **12 hours** | | | | |
| Introduction Brief outline of X86 LINUX booting process. **System Logging:** Logging –  Accounting-Available Graphical Tools. | | | | | | | | | | |
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| **Unit:3** | | **FILE FILTERS** | | | **12 hours** | | | | | |
| File Related Commands-Introduction to Piping – Some other means of joining  commands-awk commands. | | | | | | | | | | |
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| **Unit:4** | | **SHELL PROGRAMMING** | | | **12 hours** | | | | | |
| Introduction-programming constructors. **The Shell:** Command line-Standard Inputs &  Standard output-Filename Generation/pathname expansion. | | | | | | | | | | |
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| **Unit:5** | | **THE VIM EDITOR** | | | **11 hours** | | | | | |
| Introduction to Vim features-Command Mode: Moving the cursor-Deleting & changing  text -Input mode. **Computing C & C++ Programs under LINUX:** Introduction to C | | | | | | | | | | |

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| Compiler-Computing a Multi source C Program-How main is executed on LINUX-Compiling  single source C++ Program. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Computing C & C++ Programs under LINUX | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Mark G. Sobell , ” A Practical Guide to LINUX Commands, Editors and shell programming”,  Pearson, 2013 | | |
| 2 | N.B. Venkateswarlu,” Introduction to LINUX: Installation and Programming ” , BS  Publications, 2008 | | |
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| **Reference Books** | | | |
| 1 | Mr. David Tansley, “Linux And Unix Shell Programming**”,** Addison Wesley, 2000. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/117/106/117106113/> | | |
| 2 | <https://swayam.gov.in/nd2_aic20_sp05/preview> | | |
| 3 | [http://index-of.es/OS/Venkateswarlu%20N.Introducing%20Linux.Installation%20and%20](http://index-of.es/OS/Venkateswarlu%20N.Introducing%20Linux.Installation%20and%20%20Programming%20.BSP.%5BENG%2C601p.%2C2008%5D.pdf)  [Programming .BSP.%5BENG,601p.,2008%5D.pdf](http://index-of.es/OS/Venkateswarlu%20N.Introducing%20Linux.Installation%20and%20%20Programming%20.BSP.%5BENG%2C601p.%2C2008%5D.pdf) | | |
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| **Course Designed By:** Mr.S.Shankar, Department of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | M | M | M | S | M |
| **CO2** | M | S | M | M | S |
| **CO3** | S | M | M | S | M |
| **CO4** | S | S | M | M | S |
| **CO5** | M | S | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | | |  | **RDBMS AND LINUX LAB** | **L** | **T** | | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Semester IV: Elective - Group-A** | **0** | **0** | | | **5** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Computer programming** | **Syllabus Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To explain basic database concepts, applications, data models, schemas and instances. 2. To demonstrate the use of constraints and relational algebra operations and describe the basics of SQL and construct queries using SQL. 3. To emphasize the importance of normalization in databases, and to facilitate students in Database design. 4. To understand and make effective use of Linux utilities and shell scripting language to   solve problems. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Apply the basic concepts of Database Systems and Applications | | | | | | | | K3 | |
| 2 | Use the basics of SQL and construct queries using SQL in database creation and  interaction | | | | | | | | K1 | |
| 3 | Understand the basic commands of Linux operating system and can write shell  scripts knowledge and students will be able to create file systems and directories and operate them understand. | | | | | | | | K2 | |
| 4 | Design a commercial relational database system (Oracle, MySQL) by writing  SQL using the system. | | | | | | | | K5 | |
| 5 | Analyze and Select storage and recovery techniques of database system. | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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|  | | **List of Experiments (Any 6 Experiments)** | | | | | **40 hours** | | | |
| **RDBMS**   1. Creating Tables and writing simple Queries using    1. Comparison Operators, b) Logical Operators, c) Set Operators, d) Sorting and Grouping 2. Creation of Reports using Columnformat 3. Writing Queries using built in functions 4. Updating and altering tables using SQL. 5. Creation of Students Information table and write PL/SQLBlock find the Total, Average marks and Results. 6. Write a PL/SQL block to prepare the Electricity Bill. 7. Splitting the table: Write a PL/SQL block to split the students information table into two, | | | | | | | | | | |

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| one with the Passed and other failed.   1. Joining the Tables-Write a PL/SQL Block to join two tables, First table contain Roll Number, Name, Total and Second Table contains the Roll. No and Address. 2. Create a Database Trigger to check the data validity of Record. 3. Recursive Functions write a Recursive Function to find    1. Factorial of N    2. Fibonacci Series with N terms. 4. Write a Recursive function to create as sequence of Roll No’s using sequence. 5. Write a Database Trigger to implement the Master Detail Relationship. 6. Front and tools. 7. High level programming language extension 8. Menu Design. 9. Data definition, Manipulation of base tables and views. | | |
|  | **List of Experiments (Any 6 Experiments)** | **35 hours** |
| **LINUX**   1. Write a Shell script to Wish the User according to Present Time. (i.e GOOD MORNING, GOOD AFTERNOON etc) 2. Write a shell program to print the sum of all digits 3. Write a shell program which informs as soon as a specified user whose name is given along the command line is logged into the system 4. Write a shell program to print the following series    1. 2 2    2. 3 3 3    3. 4 4 4 4    4. 5 5 5 5 5    5. 6 6 6 6 6 6 5. Write a shell program which takes a source file name & directories names as command line arguments & print the message. 6. Write a shell script which removes empty files from PWD & changes other file time stamps to current time 7. Write a shell program which reads a digit & prints its BCD code 8. Write a shell program which reads a filename along the command line & prints frequency of the occurrence of words | | |

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| 1. Write shell script to see current date time username & current directories. 2. Write script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument. | | | |
|  | | **Total Practical Hours** | **75 hours** |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <http://www.nrcmec.org/pdf/Manuals/CSE/student/4-1%20lp16-17.pdf> | | |
| 2 | <http://www.becbapatla.ac.in/uploads/BCE1571460572746.pdf> | | |
| 3 | <http://www.cmrec.ac.in/downloads/academic2017-18/cse/lab/iv/lp.PDF> | | |
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| **Course Designed By:** Mr.S.Shankar, Department of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | M | S | M | M | S |
| **CO2** | S | M | S | S | M |
| **CO3** | M | S | M | S | S |
| **CO4** | S | S | M | S | M |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **SATELLITE AND NETWORK COMMUNICATION** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester I : Elective - Group-B** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Knowledge of Communication** | **Syllabus Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce the basic concepts of Satellite Communication. 2. Familiar with the Communication satellite subsystems and Application of satellites. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the orbital mechanics and basic concepts of satellite communication | | | | | | | | K2 | |
| 2 | Gain knowledge of the working of a Satellite communication system and its  other subsystems. | | | | | | | | K2 | |
| 3 | Understanding of how a satellite communication system successfully transfers  information from one earth station to another. | | | | | | | | K2 | |
| 4 | Know the applications of satellites in different areas. | | | | | | | | K2 | |
| 5 | Analyze wireless LANs | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **SATELLITE ORBITS AND INCLINATION** | | | | **11 hours** | | | | |
| Introduction - Satellite Frequency Allocation and Band spectrum –Characteristics of satellite communication system – Advantages –Active and Passive satellites- Orbit – Orbital parameters – Satellite location with Respect to Earth – Look Angles - Satellite Placement in GEO stationary  Orbit - Satellite Station Keeping. | | | | | | | | | | |
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| **Unit:2** | | **COMMUNICATION SATELLITE SUBSYSTEMS** | | | | **11 hours** | | | | |
| Electric Power Supply - Attitude and Orbit Control – Propulsion Sub System - Repeaters -  Telemetry Tracking and Command (TTC) Systems - Thermal Control System – Earth Station Design – Earth Station Subsystems – Monitoring and Control. | | | | | | | | | | |
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| **Unit:3** | | **SATELLITE APPLICATIONS** | | | **12 hours** | | | | | |
| Satellite Applications - Different Areas – Satellite Television - Telephone service – Data Communication Service – Satellites for Earth Observation – Weather Forecast – Scientific  studies – Military Applications. | | | | | | | | | | |
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| **Unit:4** | | **NETWORK CONCEPTS** | | | **12 hours** | | | | | |
| Introduction-Network Criteria- Physical Structures-Network Categories-Protocols and Standards-Network Models: Layered Tasks-The OSI Model-Peer to Peer Process-Layers in OSI  Model-Digital to Digital Conversion and Analog to Digital Conversion Techniques. | | | | | | | | | | |
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| **Unit:5** | | **WIRELESS LANS AND OTHER LANS** | | | **12 hours** | | | | | |
| IEEE Standards-Standard Ethernet-Changes in the Standard-Fast Ethernet-High Bit Ethernet- Introduction to Blue tooth- Connecting Devices-Back Bone Networks-Virtual LANs - ATM  LANs | | | | | | | | | | |

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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Earth Station Design | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Behrouz A Ferouzan ,“Data Communications and Networking,” Tata Mc Graw Hill, 2012 | | |
| 2 | Agarwal “Satellite Communication”, Khanna Publishers, 2007 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Uyless Black, “Data Communication and Distributed Networks”, Prentice Hall India, 2012 | | |
| 2 | Uyless Black , “Computer Networks”, Prentice Hall India ,II Edition, 2011. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/117/105/117105131/> | | |
| 2 | <https://nptel.ac.in/courses/106/105/106105082/> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | M | S | M | M | S |
| **CO2** | S | M | S | S | M |
| **CO3** | M | S | M | S | S |
| **CO4** | S | S | M | S | M |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **WIRELESS SENSOR NETWORKS** | **L** | | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester II : Elective - Group-B** | **4** | | | **0** | **0** | **4** |
| **Pre-requisite** | | | **Knowledge in Wireless Communication** | **Syllabus Version** | | | | **2025-26** | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Provide knowledge about the Sensor networking concepts and components 2. Learn about Transport Control Protocols &its various Security issues in Wireless Sensor Networks &Applications. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand wireless sensor networks and Infrastructure | | | | | | | K2 | |
| 2 | Understand the concept of wireless internet. | | | | | | | K2 | |
| 3 | Analyze different routing protocols. | | | | | | | K4 | |
| 4 | Know about transport layer protocols and challenges for providing QOS. | | | | | | | K2 | |
| 5 | Understand the security issues in wireless sensor networks and WSN  applications | | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **WIRELESS LANS, PANS AND MANS** | | | | **11 hours** | | | |
| Introduction - Fundamentals of WLAN – Technical issues - Network Architecture - IEEE 802.11- Physical layer - Mac layer mechanism - CSMA/CA - Bluetooth – Specification - Transport layer - Middleware Protocol Group - Bluetooth profiles - WLL – Generic WLL architecture - Technologies - Broadband Wireless access - IEEE 802.16 – Differences Between  IEEE 802.11 and 802.16 - Physical layer - Data link layer. | | | | | | | | | |
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| **Unit:2** | | **WIRELESS INTERNET** | | | | **11 hours** | | | |
| Introduction – Wireless Internet- Address mobility - Inefficiency of transport layer and application layer protocol - Mobile IP – Simultaneous binding - Route optimization- Mobile IP variations – Handoffs - IPv6 advancements - IP for wireless domain - Security in mobile IP - TCP in wireless domain – TCP over wireless - TCPs –traditional – Snoop - indirect - Mobile  Transaction-Oriented - Impact of mobility. | | | | | | | | | |
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| **Unit:3** | | **AD-HOC WIRELESS NETWORK AND WIRELESS SENSOR NETWORK** | | | **12 hours** | | | | |
| Introduction - issues – Medium access scheme – Routing - Multicasting - Transport layer protocol - Pricing scheme - QoS provisioning - Self-organization – Security – Addressing -  Service discovery - Energy management - Deployment consideration - Ad-hoc wireless internet. | | | | | | | | | |
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| **Unit:4** | | **WIRELESS SENSOR NETWORK** | | | **12 hours** | | | | |
| Introduction – Applications of sensor network, comparisons with MANET - Issues and design challenges - Architecture – Layered and clustered- Data dissemination - Data gathering Mac protocols - Location discovery - Quality of sensor network – Coverage and exposure - Zigbee  standard. | | | | | | | | | |

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| **Unit:5** | | **RECENT ADVANCES IN WIRELESS NETWORK** | **12 hours** |
| UWB radio communication- Operation of UWB systems - Comparisons with other technologies  - Major issues - Advantages and disadvantages, Wi-fi systems- Service provider models, issues, interoperability of wi-fi and WWAN, multimode 802.11 – IEEE 802.11a/b/g – Software radio- based multimode system, Meghadoot architecture -802.11 phone, Fundamentals of UMTS. Basics of IOT and IOT devices. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Software radio-based multimode system | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | William Stallings, “Wireless Communication and Networks”, Prentice Hall, 2nd edition,  2009. | | |
| 2 | C.Siva Ram Murthy and B.S. Manoj, “Ad-hoc wireless networks-architecture and protocols”,  Pearson, 2014 | | |
|  | | | |
| **Reference Books** | | | |
| 1 | Kaveh Pahlavan and Prashant Krishnamurthy, “Principle of Wireless network- A unified  approach”, Prentice Hall, 2006. | | |
| 2 | [Rappaport,](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Rappaport&search-alias=stripbooks) “Wireless Communications: Principles and Practice”, Pearson, 2010 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <http://www.digimat.in/nptel/courses/video/106105160/L22.html> | | |
| 2 | <https://www.tutorialspoint.com/Wireless-Networks> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | M | M | S |
| **CO2** | S | M | S | S | M |
| **CO3** | M | S | M | S | S |
| **CO4** | S | S | M | S | M |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **DIGITAL COMMUNICATION TECHNIQUES** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester III : Elective - Group-B** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge of Communication** | **Syllabus Version** | | | | **2025-26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Understand the basics of signal-space analysis and digital transmission. 2. Understand the coherent and non-coherent receivers and its impact on different channel characteristics. 3. Know the basics of Multicarrier and Multiuser Communications | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Analyze different Shift keying techniques | | | | | | | | K3 | |
| 2 | Develop the ability to understand the concepts of signal space analysis for coherent and  non- coherent receivers | | | | | | | | K2 | |
| 3 | Conceptually appreciate different Equalization techniques | | | | | | | | K2 | |
| 4 | Analyze different block codes and Convolutional codes. | | | | | | | | K4 | |
| 5 | Apply the generation of OFDM signals and the techniques of multiuser detection. | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **COHERENT AND NON-COHERENT**  **COMMUNICATION** | | | | **11 hours** | | | | |
| Coherent receivers – Optimum receivers in WGN – IQ modulation & demodulation – Non coherent receivers in random phase channels; MFSK receivers – Rayleigh and Rician channels – Partially coherent receivers – DPSK; M-PSK; M-DPSK-BER Performance Analysis. Carrier  Synchronization- Bit synchronization. | | | | | | | | | | |
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| **Unit:2** | | **EQUALIZATION TECHNIQUES** | | | | **11 hours** | | | | |
| Band Limited Channels- ISI – Nyquist Criterion- Controlled ISI-Partial Response signals- Equalization algorithms – Viterbi Algorithm – Linear equalizer – Decision feedback equalization –  Adaptive Equalization algorithms. | | | | | | | | | | |
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| **Unit:3** | | **BLOCK CODED DIGITAL COMMUNICATION** | | | **12 hours** | | | | | |
| Architecture and performance – Binary block codes – Orthogonal – Biorthogonal - Trans orthogonal - Shannon’s channel coding theorem - Channel capacity - Matched filter - Concepts of  Spread spectrum communication – Coded BPSK and DPSK demodulators– Linear block codes – Hammning – Golay – Cyclic - BCH - Reed – Solomon codes. Space time block codes. | | | | | | | | | | |
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| **Unit:4** | | **CONVOLUTIONAL CODED DIGITAL COMMUNICATION** | | | **12 hours** | | | | | |
| Representation of codes using Polynomial, State diagram, Tree diagram, and Trellis diagram – Decoding techniques using Maximum likelihood, Viterbi algorithm, Sequential and Threshold  methods – Error probability performance for BPSK and Viterbi algorithm, Turbo Coding. | | | | | | | | | | |
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| **Unit:5** | | **MULTICARRIER AND MULTIUSER COMMUNICATIONS** | **12 hours** |
| Single Vs multicarrier modulation, orthogonal frequency division multiplexing (OFDM), Modulation and demodulation in an OFDM system, An FFT algorithmic implementation of an OFDM system, Bit and power allocation in multicarrier modulation, Peak-to-average ratio in multicarrier modulation. Introduction to CDMA systems, multiuser detection in CDMA systems –  optimum multiuser receiver, suboptimum detectors, successive interference cancellation. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| FFT algorithmic implementation of an OFDM system | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Bernard Sklar, Fredric J. Harris “Digital Communications: Fundamentals and Applications”,  Pearson, 2020 | | |
| 2 | John G. Proakis, “Digital Communication”, Fifth Edition, Mc Graw Hill Publication, 2008. | | |
| 3 | M.K.Simon, S.M.Hinedi and W.C.Lindsey, “Digital communication techniques; Signal Design and Detection”, Prentice Hall of India, New Delhi,1995 | | |
| 4 | Richard Van Nee & Ramjee Prasad, “OFDM for Multimedia Communications” Artech House  Publication, 2001. | | |
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| **Reference Books** | | | |
| 1 | Simon Haykin, “Digital communication Systems”, John Wiley, 2013 | | |
| 2 | Stephen G. Wilson, “Digital Modulation and Coding”, Pearson, 1996 | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/117/105/117105144/> | | |
| 2 | <https://nptel.ac.in/courses/108/102/108102096/> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | M | M | S |
| **CO2** | S | S | S | S | M |
| **CO3** | S | S | M | S | S |
| **CO4** | S | S | M | S | M |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | | |  | **DIGITAL COMMUNICATION LAB** | **L** | **T** | | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | **0** | **0** | | | **5** | **4** |
| **Pre-requisite** | | | | **Semester IV: Elective - Group-B** | **Syllabus Version** | | | **2025- 26** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To identify the various encoding schemes for a given data stream 2. To design and conduct experiments, analyse and interpret data 3. To analyze various digital modulation and demodulation techniques | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand basic theories of Digital communication system in practical | | | | | | | | K2 | |
| 2 | Analyze ethical principles and commit to professional ethics and  responsibilities and norms of the practice. | | | | | | | | K4 | |
| 3 | Design a system, component or process as per needs and specifications | | | | | | | | K6 | |
| 4 | Apply appropriate techniques, skills and tools with an understanding of the  limitations | | | | | | | | K3 | |
| 5 | Understand and implement different modulation and demodulation techniques | | | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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|  | | **List of Experiments**  **(Any 6 Experiments)** | | | | | **75 hours** | | | |
| 1. Pulse Amplitude Modulation and Demodulation. 2. Pulse Width Modulation and Demodulation. 3. Pulse Position Modulation and Demodulation. 4. Time Division Multiplexing. 5. Pulse Code Modulation and Demodulation. 6. Differential Pulse Code Modulation and De modulation. 7. Delta Modulation and Demodulation 8. Amplitude Shift Keying 9. Frequency Shift Keying Methods. 10. Phase Shift Keying. 11. Differential Phase Shift Keying. 12. Quadrature Phase-Shift Keying 13. Linear Block Code-Encoder and Decoder. 14. Binary Cyclic Code - Encoder and Decoder. 15. Convolution Code - Encoder and Decoder. | | | | | | | | | | |

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| 1. Companding. 2. Source Encoder and Decoder. 3. Modulation and demodulation in an OFDM system. 4. Study of Minimum Shift Keying (MSK) Modulation and Demodulation Process. | | |
|  | **Total Practical Hours** | **75 hours** |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur. | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | M | S | M | M | S |
| **CO2** | S | M | S | S | M |
| **CO3** | M | S | M | S | S |
| **CO4** | S | S | M | S | M |
| **CO5** | S | M | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **VLSI DESIGN** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester I: Elective - Group-C** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Fundamental knowledge of ICs** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Study the design and realization of combinational & sequential digital circuits. 2. Architectural and performance tradeoffs involved in designing and realizing the circuits in CMOS. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the concepts of digital building blocks using MOS transistor. | | | | | | | | K2 | |
| 2 | Understand the fundamentals of CMOS circuits and its characteristics | | | | | | | | K2 | |
| 3 | Analyze the CMOS Delay and power strategies. | | | | | | | | K4 | |
| 4 | Design and construct Combinational and Sequential Circuits | | | | | | | | K6 | |
| 5 | Design arithmetic building blocks and memory subsystems | | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO MOS TRANSISTOR** | | | | **12 hours** | | | | |
| MOS Transistor - CMOS logic- Inverter - Pass Transistor and Transmission gate – Tristates Layout Design Rules - Gate Layouts - Stick Diagrams, Long-Channel I-V Charters tics, C-V  Charters tics, Non ideal I-V Effects - DC Transfer characteristics | | | | | | | | | | |
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| **Unit:2** | | **DELAY AND POWER** | | | | **11 hours** | | | | |
| **Delay**: Introduction – Transient Response – RCF Delay Model - Linear Delay Model – **Power**: Introduction – Dynamic Power – Static Power – Energy Delay Optimization – Low Power  Architectures | | | | | | | | | | |
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| **Unit:3** | | **COMBINATIONAL CIRCUIT DESIGN** | | | **12 hours** | | | | | |
| **Circuit Families**: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass Transistor circuits - **Circuit Pitfalls**: Threshold Drops - Ratio Failures - Leakage - Charge Sharing - Power Supply Noise - Hot Spots - Minority Carrier Injection - Back-Gate  Coupling - Diffusion Input Noise Sensitivity - Process Sensitivity - Domino Noise Budgets | | | | | | | | | | |
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| **Unit:4** | | **SEQUENTIAL CIRCUIT DESIGN** | | | **11 hours** | | | | | |
| Introduction - Static latches and Registers - Dynamic latches and Registers - Pulse Registers, Sense Amplifier Based Register – Pipelining - Schmitt Trigger - Monostable Sequential Circuits - Astable Circuits. | | | | | | | | | | |
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| **Unit:5** | | **DESIGN OF ARITHMETIC BUILDING BLOCKS AND SUBSYSTEM** | | | **12 hours** | | | | | |
| **Arithmetic Building Blocks**: Data Paths – Adders – Multipliers – Shifters – ALUs - Power and speed tradeoff’s - **Designing Memory and Array structures**: Memory Architectures and  Building Blocks - Memory Core - Memory Peripheral Circuitry. | | | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Design of Arithmetic Building Blocks | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Neil H. E. Weste, David Money Harris, “CMOS VLSI Design”, Pearson, 2017 | | |
| 2 | Jan M. Rabaey ,Anantha Chandrakasan, Borivoje. Nikolic, ‖Digital Integrated Circuits:A  Design perspective‖, Second Edition , Pearson , 2016 | | |
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| **Reference Books** | | | |
| 1 | Wayne Wolf, Modern VLSI Design: System-on-Chip Design, Prentice-Hall, 2002 | | |
| 2 | Etienne S, Sonia D Bendhia, “Basics of CMOS Cell Design”, McGraw-Hill, 2007 | | |
| 3 | Douglas A. Punknell and Kamran Eshraghian , “Basic VLSI Design” PHI, 2009 | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/117/101/117101058/> | | |
| 2 | <https://nptel.ac.in/courses/108/107/108107129/> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | M | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |
| **CO4** | S | S | S | S | M |
| **CO5** | S | S | S | M | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **LOW POWER VLSI DESIGN** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester II: Elective - Group-C** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge of VLSI Design** | **Syllabus Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To study the concepts of device behavior and modeling 2. To study the concepts of low voltage, low power logic circuits. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the basic concept of Low Power Design | | | | | | | | K2 | |
| 2 | Capability to recognize advanced issues in VLSI systems | | | | | | | | K2 | |
| 3 | Understand CMOS technology and digital CMOS design styles. | | | | | | | | K2 | |
| 4 | Analyze the development of Low Power Design | | | | | | | | K4 | |
| 5 | Analyze the Low power in Algorithm and Architectural level | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO LOW POWER DESIGN** | | | | **11 hours** | | | | |
| Need for low power VLSI chips - Sources of power dissipation on Digital Integrated circuits - Emerging Low power approaches - Physics of power dissipation in CMOS devices - Dynamic dissipation in CMOS - Transistor sizing & Gate oxide thickness - Impact of technology Scaling -  Technology and Device innovation | | | | | | | | | | |
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| **Unit:2** | | **SIMULATION POWER ANALYSIS AND PROBABILISTIC POWER ANALYSIS** | | | | **12 hours** | | | | |
| SPICE circuit simulators - Gate level logic simulation - Capacitive power estimation - Static state power - Gate level capacitance estimation - Architecture level analysis - Monte Carlo simulation - Random logic signals - Probability and frequency - Probabilistic power analysis techniques -  Signal entropy. | | | | | | | | | | |
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| **Unit:3** | | **LOW POWER DESIGN** | | | **12 hours** | | | | | |
| **Circuit level**: Power consumption in circuits - Flip Flops and Latches design - High capacitance nodes - Low power digital cells library - **Logic level**: Gate reorganization - Signal gating - Logic  encoding - State machine encoding - Pre computation logic. | | | | | | | | | | |
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| **Unit:4** | | **LOW POWER ARCHITECTURE AND CLOCK DISTRIBUTION** | | | **12 hours** | | | | | |
| Power and Performance management - switching activity reduction - Parallel architecture with voltage reduction - Flow graph transformation - Low power arithmetic components - Power dissipation in clock distribution - Single driver vs Distributed buffers - Zero skew vs tolerable  skew - Chip and package co-design of clock network | | | | | | | | | | |
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| **Unit:5** | | **ALGORITHM AND ARCHITECTURAL LEVEL METHODOLOGIES** | | | **11 hours** | | | | | |

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| Introduction - Design flow - Algorithmic level analysis and optimization - Architectural level  estimation and synthesis. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Chip and package co-design of clock network | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Gary Yeap, “Practical Low Power Digital VLSI Design”, Springer, 2012 | | |
| 2 | Kaushik Roy and Sharat C. Prasad, “Low-Power CMOS VLSI Circuit Design” ,Wiley-  Interscience, 2000 | | |
| 3 | Rabaey, M. Pedram, “Low Power Design Methodologies”, Kluwer Academic Publications,  1996. | | |
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| Reference Books | | | |
| 1 | Dimitrios Soudris, Christian Piguet, Costas Goutis, “Designing CMOS circuits for low  power”, Kluwer Academic Publishers,2002. | | |
| 2 | Christian Piguet, “Low-power CMOS circuits: technology, logic design and CAD tools”,  CRC Press, Taylor & Francis Group, 2006. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/106/105/106105034/> | | |
| 2 | https://nptel.ac.in/courses/117/101/117101004/ | | |
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| **Course Designed By:**  Mrs.S.Sangeethavanathi, Department of Electronics, Sri Vasavi College, Erode. | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | M | M | S |
| **CO3** | S | S | M | S | S |
| **CO4** | S | M | M | M | S |
| **CO5** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **VLSI DESIGN USING VERILOG** | | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester III: Elective - Group-C** | | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge of basic Digital electronic**  **circuits** | **Syllabus**  **Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Study and design digital circuits using Verilog HDL 2. Learn the design of VLSI circuits | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | The ability to code and simulate any digital function in Verilog HDL | | | | | | | K4 | |
| 2 | Model digital systems in verilog HDL at different levels of abstraction | | | | | | | K5 | |
| 3 | Know the simulation techniques and test bench creation. | | | | | | | K2 | |
| 4 | Understand the design flow from simulation to synthesizable version | | | | | | | K2 | |
| 5 | Analyze the process of synthesis and post-synthesis | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **BASICS** | | | **11 hours** | | | | |
| Synthesis – Design Process – Logic Value System – Logic value system – Bit-widths – Value Holders and Hardware Modeling –Logical operators – Arithmetic operators – Relational operators – Equality operators – Shift operators – Bitwise operators – Concatenation Operator – Operator  Precedence | | | | | | | | | |
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| **Unit:2** | | **VERILOG CONSTRUCTS TO GATES** | | | **11 hours** | | | | |
| Conditional Expression - Always Statement - If Statement - Inferring Latches from If Statements - Case Statement: Casez - Casex - Inferring Latches from Cases Statement - Full Case - Parallel Case - Non Constant as Case Item - Loop Statement - Functions - Tasks - Using Values X and Z -  The Value x - The Value z | | | | | | | | | |
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| **Unit:3** | | **ADDITIONAL FEATURES OF VERILOG** | | **12 hours** | | | | | |
| Arrays of Primitives - Arrays of Modules - Hierarchical Dereferencing - Parameters Substitution - Procedural Continuous Assignment - Intra Assignment Delay - Indeterminate Assignments and  Race Condition – wait Statement – fork join Statement – Named Events – Constructs Supported by Synthesis Tools | | | | | | | | | |
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| **Unit:4** | | **MODELING EXAMPLES** | | **12 hours** | | | | | |
| Modeling Combinational Logic - Modeling sequential logic - Modeling a memory - Writing Boolean equations - Modeling a counter - Modeling a parameterized adder - Modeling a parameterized comparator – Modeling a decoder – Modeling a multiplexer. | | | | | | | | | |
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| **Unit:5** | | **MODEL OPTIMIZATIONS AND VERIFICATION** | | **12 hours** | | | | | |
| Resource Allocation – Common Sub-expressions – Moving Code – Common Factoring – Commutativity and Associativity – Dead-code elimination and Constant folding – Flip-flop and Latch optimizations – Design Size – Using Parentheses – A Test Bench – Delays in Assignment  Statements – Unconnected Ports – Missing Latches | | | | | | | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Parameters Substitution - Procedural Continuous Assignment | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Bhasker J, “ Verilog HDL Synthesis, A Practical Primer” , Star Galaxy Publishing, 2018 | | |
| 2 | Micheal D. Ciletti, “ Advanced Digital Design with the Verilog HDL”, Pearson, 2011 | | |
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| **Reference Books** | | | |
| 1 | Stephen Brown and ZvonkoVranesic, “Fundamentals of Digital Logic with Verilog”, McGraw  Hill , 2017 | | |
| 2 | Samir Palnitkar, “Verilog HDL: A Guide to Digital Design and Synthesis”, Prentice Hall, 2003 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/106/105/106105165/> | | |
| 2 | <https://onlinecourses.nptel.ac.in/noc19_cs72/preview> | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |
| **CO4** | S | M | S | M | S |
| **CO5** | S | S | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | | |  | **VLSI SYSTEM DESIGN LAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Semester IV: Elective - Group-C** | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | | **Knowledge of basic Mathematics, Digital**  **Electronic circuits and Programming languages** | **Syllabus Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. Design and Test of multiplexers, coders and Test of flip-flops 2. Learn the design of FPGA based design methodology. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Design and test digital logic circuits on FPGA. | | | | | | | | K6 | |
| 2 | Design combinational and sequential circuits at circuit level | | | | | | | | K6 | |
| 3 | Implement efficient techniques at circuit level for improving power and speed of  combinational and sequential circuits | | | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
|  | | **List of Experiments (Any 12 Experiments)** | | | | | **75 hours** | | | |
| 1. Synchronous counter 2. Asynchronous counter 3. Clock divider and generator 4. FIFO Design 5. Multiplexer design 6. Encoder 7. Decoder 8. Comparator 9. Latches and flip flops 10. ALU Design 11. Parity generator 12. UART Module 13. SPI module 14. Memory module 15. Sequence detector | | | | | | | | | | |
|  | | | **Total Practical Hours** | | | **75 hours** | | | | |
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| **Course Designed By:** Dr. K. Rajendran, Department of Electronics, LRG Government Arts  College for Women, Tiruppur | | | | | | | | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **FOUNDATIONS OF ARTIFICIAL INTELLIGENCE** | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester I: Elective - Group-D** | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge of basic Artificial Intelligence** | **Syllabus**  **Version** | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. To introduce basic concepts and history of Artificial Intelligence (AI) 2. To familiarize with various AI problem-solving techniques and search strategies 3. To understand knowledge representation and reasoning in AI systems 4. To study machine learning basics and AI programming paradigms 5. To expose students to practical AI applications relevant to electronics and computing | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Gain foundational knowledge of AI principles and terminology | | | | | | K1 | |
| 2 | Apply search algorithms and problem-solving methods to simple AI tasks | | | | | | K1 | |
| 3 | Design knowledge-based systems with appropriate representation schemes | | | | | | K2 | |
| 4 | Understand and implement basic machine learning concepts | | | | | | K2 | |
| 5 | Analyze real-world AI applications and their impact on electronic systems | | | | | | K3 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
|  | | | | | | | | |
| **Unit:1** | | **INTRODUCTION TO ARTIFICIAL INTELLIGENCE** | | **12 hours** | | | | |
| History of AI – Definitions and Scope – Intelligent Agents – Problem Solving – State Space Search – Uninformed Search: BFS, DFS – Informed Search: Greedy, A\* – Heuristics – Constraints Satisfaction Problems – Applications of AI | | | | | | | | |
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| **Unit:2** | | **KNOWLEDGE REPRESENTATION AND REASONING** | | **12 hours** | | | | |
| Logic and Propositional Calculus – Predicate Logic – Inference Rules – Forward and Backward Chaining – Semantic Networks – Frames – Ontologies – Rule-Based Systems – Truth Maintenance Systems – Uncertainty Handling: Probability, Bayesian Networks | | | | | | | | |
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| **Unit:3** | | **MACHINE LEARNING BASICS** | | **12 hours** | | | | |
| Supervised Learning – Unsupervised Learning – Reinforcement Learning – Decision Trees – Neural Networks Overview – Support Vector Machines – Clustering Methods – Overfitting and Regularization – Performance Metrics – Feature Selection and Extraction | | | | | | | | |
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| **Unit:4** | | **AI PROGRAMMING PARADIGMS AND LANGUAGES** | | **12 hours** | | | | |
| AI Programming Languages Overview (LISP, Prolog, Python) – Search Algorithm Implementation – Knowledge Base Construction – Logic Programming – Constraint Logic Programming – Rule-Based Systems Programming – Machine Learning Libraries Introduction (scikit-learn, TensorFlow basics) – AI in Electronics Applications | | | | | | | | |
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| **Unit:5** | | **ADVANCED TOPICS AND APPLICATIONS** | | **12 hours** |
| Natural Language Processing Basics – Computer Vision Overview – Robotics and Automation – Expert Systems in Electronics – Fuzzy Logic – Evolutionary Algorithms – AI Ethics and Social Impact – AI Trends and Future Directions | | | | |
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|  | | **Total Lecture Hours** | **60 hours** | |
| **Text Book(s)** | | | | |
| 1 | Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 4th Edition, 2020 | | | |
| 2 | Ethem Alpaydin, Introduction to Machine Learning, MIT Press, 4th Edition, 2020 | | | |
| 3 | Nils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann, 1998 | | | |
|  | | | | |
| **Reference Books** | | | | |
| 1 | Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Tata McGraw Hill, 3rd Edition, 2009 | | | |
| 2 | R.G. Smith, Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project, Addison-Wesley, 1983 | | | |
| 3 | Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, 2012 | | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | |
| 1 | <https://www.coursera.org/learn/machine-learning> | | | |
| 2 | https://ai.google/education/ | | | |
| 3 | https://www.tutorialspoint.com/artificial\_intelligence/index.htm | | | |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |
| **CO4** | S | M | S | M | S |
| **CO5** | S | S | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **MACHINE LEARNING FOR ELECTRONIC DATA ANALYSIS** | | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester II: Elective - Group-D** | | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge of basic Machine Learning for Electronic Data Analysis** | **Syllabus**  **Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce fundamental machine learning concepts and algorithms 2. Enable understanding of ML applications in electronic signal and data analysis 3. Develop skills in data preprocessing and feature extraction for electronics data 4. Explore supervised, unsupervised, and reinforcement learning techniques 5. Apply machine learning models to real-world electronic datasets and diagnostics | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand core machine learning principles and workflows | | | | | | | K1 | |
| 2 | Preprocess and analyze electronic data using ML techniques | | | | | | | K2 | |
| 3 | Implement classification, regression, and clustering algorithms for electronics data | | | | | | | K2 | |
| 4 | Evaluate model performance with appropriate metrics | | | | | | | K3 | |
| 5 | Design ML-based solutions for electronic system monitoring and fault detection | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO MACHINE LEARNING AND DATA ANALYSIS** | | | **12 hours** | | | | |
| Machine Learning Overview – Types of Learning – Supervised, Unsupervised, Reinforcement – Electronic Data Characteristics – Data Acquisition and Sensors – Signal Preprocessing – Noise Reduction Techniques – Feature Extraction – Dimensionality Reduction – Data Normalization – Sampling Techniques – Data Visualization | | | | | | | | | |
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| **Unit:2** | | **SUPERVISED LEARNING ALGORITHMS** | | | **12 hours** | | | | |
| Linear Regression – Logistic Regression – Decision Trees – Random Forests – Support Vector Machines – K-Nearest Neighbors – Naive Bayes Classifier – Training and Testing Data – Cross-Validation – Overfitting and Underfitting – Hyperparameter Tuning – Applications in Electronic Data Classification | | | | | | | | | |
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| **Unit:3** | | **UNSUPERVISED LEARNING ALGORITHMS** | | **12 hours** | | | | | |
| Clustering Methods: K-Means, Hierarchical, DBSCAN – Principal Component Analysis (PCA) – Independent Component Analysis (ICA) – Anomaly Detection – Dimensionality Reduction Techniques – Density Estimation – Applications in Signal Segmentation and Fault Detection – Visualization of Clusters – Feature Learning – Data Compression | | | | | | | | | |
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| **Unit:4** | | **ADVANCED MACHINE LEARNING CONCEPTS** | | **12 hours** | | | | | |
| Ensemble Learning – Boosting and Bagging – Neural Networks Basics – Deep Learning Introduction – Recurrent Neural Networks (RNN) and CNN Overview – Time Series Analysis – Reinforcement Learning Basics – Transfer Learning – Autoencoders – Model Evaluation Metrics – ROC, Precision, Recall, F1-Score – Applications in Predictive Maintenance | | | | | | | | | |
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| **Unit:5** | | **MACHINE LEARNING TOOLS AND APPLICATIONS IN ELECTRONICS** | **12 hours** | |
| ML Frameworks (TensorFlow, scikit-learn, PyTorch) – Data Pipeline Construction – Real-time Data Processing – Embedded ML Systems – Case Studies: ECG/EEG Signal Analysis – Vibration Analysis in Rotating Machines – Fault Diagnosis in Electronic Circuits – Predictive Analytics for Electronic Devices – Simulation and Modeling – Ethical Issues in AI/ML | | | | |
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|  | | **Total Lecture Hours** | | **60 hours** |
| **Text Book(s)** | | | | |
| 1 | Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, O'Reilly Media, 2nd Edition, 2019 | | | |
| 2 | Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer, 2nd Edition, 2009 | | | |
| 3 | Ethem Alpaydin, Introduction to Machine Learning, MIT Press, 4th Edition, 2020 | | | |
|  | | | | |
| **Reference Books** | | | | |
| 1 | Tom M. Mitchell, Machine Learning, McGraw-Hill Education, 1997 | | | |
| 2 | Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012 | | | |
| 3 | Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, 2012 | | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | |
| 1 | <https://www.coursera.org/learn/machine-learning> | | | |
| 2 | https://machinelearningmastery.com/start-here/ | | | |
| 3 | https://scikit-learn.org/stable/tutorial/index.html | | | |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |
| **CO4** | S | M | S | M | S |
| **CO5** | S | S | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **AI FOR ELECTRONIC APPLICATIONS** | | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester III: Elective - Group-D** | | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge of basic AI Electronic Applications** | **Syllabus**  **Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To explore AI techniques specifically tailored for electronic system applications 2. To understand AI-driven fault detection, diagnosis, and predictive maintenance 3. To study AI integration with electronic instrumentation and control systems 4. To examine AI’s role in automation and intelligent electronic devices 5. To develop skills in applying AI models to solve practical electronics problems | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Analyze electronic system problems using AI methodologies | | | | | | | K1 | |
| 2 | Implement AI-based fault diagnosis and predictive models for electronics | | | | | | | K2 | |
| 3 | Design AI-enabled intelligent instrumentation and control systems | | | | | | | K3 | |
| 4 | Integrate AI algorithms into automation and robotics in electronics | | | | | | | K4 | |
| 5 | Evaluate AI applications’ impact on performance and reliability of electronics | | | | | | | K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **OVERVIEW OF AI IN ELECTRONICS** | | | **12 hours** | | | | |
| AI in Electronics – Intelligent Systems – Electronic Instrumentation Basics – Signal Processing – Sensor Data Analytics – AI vs Traditional Methods – Fault Detection Concepts – Predictive Maintenance – AI Hardware Requirements – Embedded AI – Edge Computing – Case Studies in Electronics | | | | | | | | | |
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| **Unit:2** | | **AI TECHNIQUES FOR ELECTRONIC FAULT DIAGNOSIS** | | | **12 hours** | | | | |
| Rule-Based Systems – Expert Systems – Fuzzy Logic Controllers – Neural Networks for Fault Detection – Support Vector Machines – Decision Trees – Bayesian Networks – Signal Anomaly Detection – Feature Extraction from Electronic Signals – Data Fusion Techniques – Pattern Recognition – Fault Classification | | | | | | | | | |
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| **Unit:3** | | **AI IN ELECTRONIC CONTROL SYSTEMS** | | **12 hours** | | | | | |
| AI-Based PID Controllers – Adaptive Control Systems – Reinforcement Learning in Control – Intelligent Sensor Fusion – Model Predictive Control – AI for Power Electronics – Smart Grids and AI – AI for Motor Control – AI in Embedded Controllers – Optimization Techniques – Real-Time Processing – Feedback Systems | | | | | | | | | |
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| **Unit:4** | | **INTELLIGENT INSTRUMENTATION AND AUTOMATION** | | **12 hours** | | | | | |
| Virtual Instrumentation – AI-Enabled Test and Measurement – Data Acquisition Systems – Automated Calibration – AI for Signal Filtering – Robotics and AI Integration – Computer Vision in Electronics Testing – Voice and Gesture Control – Smart Home Electronics – IoT and AI Synergy – Automation Case Studies – AI in Manufacturing Electronics | | | | | | | | | |
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| **Unit:5** | | **EMERGING TRENDS AND APPLICATIONS** | **12 hours** | |
| AI in Semiconductor Manufacturing – Quantum Computing Basics – AI for Nanoelectronics – AI in Wireless Communication – Edge AI and IoT Devices – AI Ethics and Security in Electronics – AI for Energy Management – AI-Powered Electronic Design Automation – Future of AI in Electronics – AI-Driven Predictive Analytics – AI in Biomedical Electronics – Industrial Case Studies | | | | |
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|  | | **Total Lecture Hours** | | **60 hours** |
| **Text Book(s)** | | | | |
| 1 | S. Rajasekaran, G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications, Prentice Hall India, 2003 | | | |
| 2 | Daniel P. Gahler, Artificial Intelligence for Embedded Systems, CRC Press, 2020 | | | |
| 3 | D. D. Ganji, Artificial Intelligence and IoT for Smart Electronic Systems, Wiley, 2021 | | | |
|  | | | | |
| **Reference Books** | | | | |
| 1 | Philip A. Laplante, Artificial Intelligence and Expert Systems for Engineers, CRC Press, 1992 | | | |
| 2 | R. M. Tong, AI Techniques for Electronic Circuit Fault Diagnosis, Springer, 2018 | | | |
| 3 | Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 4th Edition, 2020 | | | |
|  | | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | |
| 1 | https://www.edx.org/course/artificial-intelligence-ai | | | |
| 2 | https://ai.google/education/ | | | |
| 3 | <https://ieeexplore.ieee.org/Xplore/home.jsp> | | | |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |
| **CO4** | S | M | S | M | S |
| **CO5** | S | S | M | S | S |

\*S-Strong; M-Medium; L-Low

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| **Course code** | |  | **VIRTUAL AI ELECTRONICS LAB** | | | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester IV: Elective - Group-D** | | | **4** | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge of basic Virtual AI Electronics Lab** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To simulate and analyze electronics systems using AI-based tools and virtual platforms 2. To develop hands-on skills in virtual testing, fault detection, and AI-based optimization 3. To prepare students for modern lab environments without physical hardware dependency | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Perform AI-assisted simulations and analysis of electronic circuits and systems | | | | | | | | K3 | |
| 2 | Implement intelligent fault prediction and system optimization using virtual platforms | | | | | | | | K4 | |
| 3 | Integrate AI models into virtual electronic design automation and testing processes | | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
|  | | | | | | | | | | |
|  | | **List of Experiments (Any 12 Experiments)** | | | | **75 hours** | | | | |
| 1. Simulation of Logic Gates with AI-based Truth Table Predictor 2. Virtual Sensor Data Acquisition and Preprocessing using AI Tools 3. Intelligent Signal Classification using Machine Learning Models 4. AI-Based Fault Detection in Amplifier Circuits 5. Smart Power Supply Simulation with Fault Analysis 6. Virtual Multimeter using AI for Measurement Prediction 7. DC Motor Speed Control using Virtual AI-PID Tuning 8. AI-Powered Oscilloscope Data Analysis and Interpretation 9. Virtual Robotics Arm Control with AI-Based Motion Prediction 10. Electronic Component Identification using Virtual AI Vision 11. Predictive Maintenance for Virtual Embedded Systems 12. Simulation of Home Automation using AI Decision Models 13. AI-Driven Optimization of Analog Filter Design 14. Voice-Controlled Virtual Electronics Simulation 15. Virtual PCB Defect Detection using Image Processing AI | | | | | | | | | | |
|  | | **Total Lecture Hours** | | | **60 hours** | | | | | |
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| **Course Designed By:** Dr. S. Kumar, Department of Electronics, Sri Vasavi College, Erode | | | | | | | | | | |

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| **Mapping with Programme Outcomes** | | | | | |
| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** |
| **CO1** | S | S | S | S | S |
| **CO2** | S | S | S | M | S |
| **CO3** | S | S | S | S | S |

\*S-Strong; M-Medium; L-Low

Annexure

**BHARATHIAR UNIVERSITY : : COIMBATORE 641046**

**DEPARTMENT OF ELECTRONICS AND COMMUNIATION SYSTEM**

# MISSION

* Excellence in education, grounded in ethics and critical thinking, for improvement of life.
* Build a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit and moral responsibilities
* Facilitate industry institution interaction in teaching, learning and consultancy to accomplish the technological needs of the society.
* To promote research culture in the emerging areas of Electronics and interdisciplinary domains