

**M.Sc. Applied Electronics**

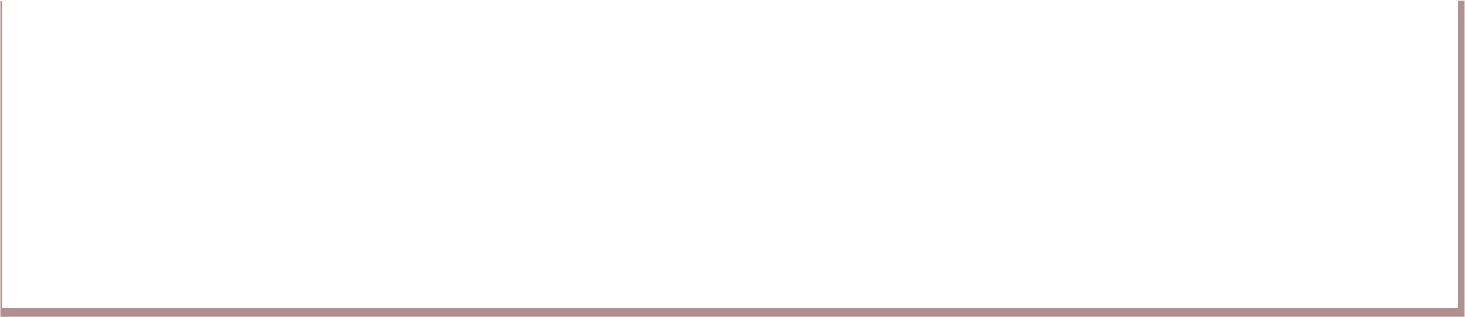
Syllabus

AFFILIATED COLLEGES

**Program Code: 32M**

**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. Applied Electronics** 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. Applied Electronics** program, the students are  expected to | |
| PSO1 | Capable to analyze real time problems, design appropriate systems to provide  solutions that are technically sound, economically feasible and socially acceptable |
| PSO2 | Ability to design and implement projects in the field of Electronics like PIC Microcontroller, Raspberry Pi with Python Programming and Internet of Things  with Arduino. |
| PSO3 | Students will be furnished with necessary Soft skills, Aptitude and Technical  skills to work in the Software and Hardware Industry. |
| PSO4 | Analyze specific problems relevant to signal and image processing by applying  the knowledge of basic sciences, mathematics and core fundamentals. |
| PSO5 | Demonstrate and implement variety of automation system by controlling, processing different signals according to the required specifications keeping in  mind it’s societal and environment effect. |

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| **Program Outcomes (POs)** | |
| On successful completion of the M. Sc. Applied Electronics program | |
| PO1 | Capable to achieve state-of-art knowledge in Electronics, to discriminate, evaluate, analyze and create existing and new knowledge, and integration of the  same for enhancement of knowledge. |
| PO2 | Discover, formulate, review and analyze intricate emerging electronics problems  to make intellectual knowledge for conducting research in a wider theoretical and practical. |
| PO3 | Extract information about important problems and apply suitable 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 the field of Electronics  Profession. |
| PO5 | Identify 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., APPLIED ELECTRONICS**

**(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 IC’s and its Applications | 4 | 4 | - | 25 | 75 | 100 |
| 13C | Microwave and RADAR  Navigation Systems | 4 | 4 | - | 25 | 75 | 100 |
| 13D | MEMS and Power Electronics | 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 | Digital Signal Processing | 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 | Digital Image Processing | 4 | 4 | - | 25 | 75 | 100 |
| 33C | PC Hardware and Troubleshooting | 4 | 4 | - | 25 | 75 | 100 |
| 33D | Nano Electronics and Technology | 4 | 4 | - | 25 | 75 | 100 |
| 33 I | Summer Internship | 2 | - | - | 25 | - | 25 |
|  | Health and Wellness | 1 | - | 2 | 25 | - | 25 |
| 33P | PC Hardware and VHDL  Programming Lab | 4 | - | 4 | 25 | 75 | 100 |
| 33Q | DSP and DIP Lab | 4 | - | 4 | 25 | 75 | 100 |
| - | Elective III \* | 4 | 4 | - | 25 | 75 | 100 |
| **Total** | | **31** | **20** | **10** | **225** | **525** | **750** |

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| **FOURTH SEMESTER** | | | | | | | |
| 47V | Project Work & Viva Voce | 7 | 10 | - | 50 | 150 | 200 |
| - | Elective Practical \* | 4 | - | 5 | 25 | 75 | 100 |
| **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 | Electronic Test Instruments |
| 2EB | II | Analytical Instrumentation |
| 3EB | III | Virtual Instrumentation |
| 4EQ | IV | Instrumentation 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**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Digital Fundamental and Basics of Microcontroller** | **Syllabus Version** | | | |  | | |
| **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**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Understanding of Electronic Circuits** | **Syllabus Version** | | | |  | | |
| **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** | |  | **MICROWAVE AND RADAR NAVIGATION SYSTEMS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | | **0**  **2025-2026** | **4** |
| **Pre-requisite** | | | **Basics of wave guides and wave propagation** | **Syllabus Version** | | | |  | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To analysis the microwave circuits and systems 2. Understand the concepts of Microwaves, Microwave transmission modes, Transmission lines, Microwave Amplifiers and Oscillators. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand various microwave system components their properties. | | | | | | | | K2 | |
| 2 | Applying microwave devices used to realized amplifiers and oscillators | | | | | | | | K3 | |
| 3 | Analyze performance of microwave components from field point of view | | | | | | | | K4 | |
| 4 | To understand the basic concepts ,types ,working of radar | | | | | | | | K2 | |
| 5 | Correlating RADAR system as microwave application | | | | | | | | K4 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **INTRODUCTION TO MICROWAVE** | | | | **12 hours** | | | | |
| Introduction – Maxwell’s equation – Ampere’s law – Faraday’s law – Gauss law – Wave equation – TE, TM wave equation – Wave guides – Rectangular wave guides – Propagation of waves in rectangular wave guides – TM and TM modes – Propagation of TM waves in  rectangular wave guides – TM modes in rectangular wave guides. | | | | | | | | | | |
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| **Unit:2** | | **MICROWAVE AMPLIFIERS AND OSCILLATORS** | | | | **11 hours** | | | | |
| Klystrons – Two cavity klystrons – Multicavity klystrons – Reflex klystrons – Power output and frequency characteristics – Efficiency of reflex klystron – Traveling wave tube (TWT) – Applications of TWT – Backward wave oscillator – Magnetron – Cavity magnetron – Sustained  oscillation in magnetron – Characteristics and applications of magnetron. | | | | | | | | | | |
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| **Unit:3** | | **MICROWAVE ANTENNAS** | | | **12 hours** | | | | | |
| Quantitative theory of short dipole antenna – Characteristics of grounded quarter wave and ungrounded half wave antenna – Radiation resistance and radiation pattern – Folded dipole and its application – Broad side and fire array – Loop antenna – Direction finding by Adcock and beeline tossi system – Helical – Rhombic – YAGI antenna – Horn antenna and parabolic  reflectors. | | | | | | | | | | |
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| **Unit:4** | | **PRINCIPLES OF RADAR** | | | **12 hours** | | | | | |
| Introduction – Block diagram of radar – Application of radar – Range equation – Minimum detectable signal – Receiver noise – S/N ratio – Transmitter power – Maximum ambiguous range – System losses - Receiver: Duplexer – Local oscillator – Mixer – Line pulse modulator –  Displays – PPI | | | | | | | | | | |

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| **Unit:5** | | **FM RADAR AND MTI** | **11 hours** |
| Doppler effect – CW radar – FM CW radar – multiple frequency CW radar – Moving Target  Indicator (MTI) – Non coherent MTI – Pulsed Doppler radar fm altimeter – Tracking – Sequential lobbing – Conical scan – Mono pulse tracking radar | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Wave equation and Radar range equation | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Kulkarni M, “Microwave and Radar Engineering**”,** Umesh Publication, 2009 | | |
| 2 | Merrill I. Skolnik, “Introduction to radar systems”, McGraw Hill, 2001 | | |
| 3 | Prasad K.D., **“**Antenna and Propagation**”,** Sathya Pradhasan Publications,2003 | | |
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| **Reference Book** | | | |
| 1 | [Maini](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor%3A%22A.%2BK.%2BMaini%22) A. K. Microwaves and Radar Principles and Applications, Khanna, 1999 | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/108/101/108101112/> | | |
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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 | 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** | |  | **MEMS AND POWER ELECTRONICS** | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | **0**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Knowledge on IC fabrication and the Operation of Power electronic Devices** | **Syllabus Version** | |  | | |
| **Course Objectives:** | | | | | | | | |
| The main objectives of this course are to:   1. To understand the basic concepts of MEMS device and its fabrication technique 2. To analyse the basic functions and design of Power Electronics circuits 3. To implement the use of power electronics in real time applications | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | |
| 1 | Understand the basic terms of Micro System and concepts which are needed for  Electronic and Communication | | | | | | K2 | |
| 2 | Understand basic concepts of MEMS device design and it’s fabrication methods | | | | | | K2 | |
| 3 | Apply the Power electronic components used for different Power Electronic  Circuits | | | | | | K3 | |
| 4 | Analyze the problem solving skills and proficiency in Power  Electronics circuit analysis. | | | | | | K4 | |
| 5 | Express the basic working principles of Inverters and power supplies. | | | | | | K2 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | |
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| **Unit:1** | | **OVERVIEW AND WORKING PRINCIPLES OF MEMS** | | | **11 hours** | | | |
| MEMS and Microsystem: Typical MEMS and Microsystems products - Microsystems and Microelectronics -Miniaturization - Applications of Microsystems - Micro sensors - Micro actuation - Micro grippers - Micro motors- Micro accelerometer – Micro fluids | | | | | | | | |
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| **Unit:2** | | **FABRICATION AND MICRO SYSTEM DESIGN** | | | **12 hours** | | | |
| Ions and Ionization- Doping - Substrate and wafers - Silicon as a substrate - Silicon compounds- Piezo Resistors - Piezo Crystals – Photolithography - Ion implantation – Diffusion - Oxidation – Chemical vapor deposition – sputtering – deposition by Epitaxy- Physical Vapor Deposition (PVD) - Etching - Surface Micromachining - LIGA process - Microsystems Design Considerations - Use of CAD and tools in Microsystems design -Process design – Design of silicon die for a micro pressure sensor –Computer Aided Design – Micro system packaging –  Introduction to intelligence CAD tool for MEMS. | | | | | | | | |
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| **Unit:3** | | **POWER ELECTRONIC DEVICES AND CIRCUITS** | | | **12 hours** | | | |
| Review and Operations of SCR, DIAC,TRIAC and IGBT- **Thyristor Commutation:** Natural commutation - Forced commutation - Self commutation - Impulse commutation - Response pulse commutation - External pulse commutation - complementary commutation - **Controlled Rectifiers**: Principle of Phase controlled converter- Single-Phase full converter - Single-phase  semi converter - Principle of Three phase half wave converter | | | | | | | | |
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| **Unit:4** | | **AC VOLTAGE CONTROLLERS AND DC CHOPPERS** | | | **12 hours** | | | |

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| **AC voltage controllers:** Principle of On/Off Control - Principle of Phase Control - Single Phase Bi-Directional Controllers with Resistive and Inductive Loads - Cyclo-Converters - Single Phase Cyclo-Converters - **DC Choppers:** Principles of Step-down Operation -Step down with RL load- Principle of Step-up Operation - **Switch mode regulators:** Buck Regulator - Boost Regulator - Buck Boost Regulator - CUK Regulator | | | |
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| **Unit:5** | | **INVERTERS AND STATIC SWITCHES** | **11 hours** |
| **Inverters:** Principle of Operation - Single Phase Bridge Inverter - Three-Phase Inverter -PWM Voltage Control Power Supplies – Introduction to applications of power electronics in automotive system - **Power supplies:** DC Power Supplies -Switched Mode Power Supplies (SMPS) - UPS - AC Power Supplies: Switched mode AC power supply - Resonant AC Power supply - Bi-Directional AC Power supply - **AC and DC static switches**: Introduction - Single phase AC switches - Three phase AC switches - Three phase reversing switches - DC switches Static circuit breaker - AC and DC solid state relays | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Microsystems Design Considerations and Use of CAD tools in Microsystems design | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Tai-Ran-Hsu, “MEMS & Micro Systems Design and Manufacture”, Tata McGraw Hill  Education Private Limited, 2002. | | |
| 2 | Muhammed Rashid, “Power Electronics, Circuits, devices and Applications”, Prentice Hall  Edition, Third Edition, 2004 | | |
| 3 | P.S.Bimbra, “Power Electronics”, Khanna Publishers, Fourth Edition, 2011. | | |
| **Reference Book(s)** | | | |
| 1 | James. J.Allen, “ Micro Electro Mechanical System Design” Taylor & Francis Group, 2005 | | |
| 2 | Sen “Power Electronics” –Mc GrawHill International, 1989. | | |
| 3 | Jaganathan.V, “Power Electronics Devices and Circuits”, PHI Learning Pvt. Ltd, 2011. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <http://nptel.ac.in/courses/117105082> | | |
| 2 | <https://nptel.ac.in/courses/108/108/108108113/> | | |
| 3 | https://nptel.ac.in/courses/108/102/108102145/ | | |
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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 | M | S | M | S |
| **CO2** | S | S | M | S | S |
| **CO3** | S | S | M | S | S |
| **CO4** | S | M | S | M | S |
| **CO5** | S | M | S | M | 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**  **2025-2026** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and**  **Computer programming** | **Syllabus**  **Version** | | | |  | | |
| **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** | |  | **DIGITAL SIGNAL PROCESSING** | **L** | | | **T** | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | **4** | | | **0** | **0**  **2025-2026** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Signals and System** | **Syllabus** | | | |  | |
| **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 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 | | |
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| **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. | | |
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| **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:** 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 | 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** | | |  | **VHDL PROGRAMMING** | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | | **4** | | **0**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Hardware Description Programming Language with Simulation Software’s** | **Syllabus Version** | | | |  | | |
| **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** | | **BEHAVIOURAL MODELING TECHNIQUES OF VHDL** | | | | | **12 hours** | | | | |
| Behavioral Modeling: 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 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 10K  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, 1999. | | |
| 2 | Charles H. Roth, Jr., Lizy K. John, “Digital Systems Design Using VHDL”, Cengage  Learning, 2016. | | |
|  | | | |
| **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**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Basic Mathematics, Programming &**  **Automation knowledge is Essential** | **Syllabus**  **Version** | | | |  | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:  To know the automated learning techniques.  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** | | | | |

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| **Text Book(s)** | |
| 1 | P. Kaliraj, T. Devi, Higher Education for Industry 4.0 and Transformation to Education 5.0,  2020 |
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| **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** | | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | **Basic Concepts in Electronics** | **Syllabus Version** | | | | **2025-2026** | | |
| **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 Hrs.** | | | | |
| 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. 20. Switching Circuits For TRIAC. | | | | | | | | | | |

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| 1. Thyristor Chopper. 2. Single Phase Invertor (20W) 3. Power Amplifier Using LM 380. 4. Different Triggering Circuits for Thyristor. 5. Study a Firing Circuit Suitable for Single Phase Half Controlled Convertor. 6. Single Phase Half Controlled Bridge Convertor with Two Thyristors & Two Diodes. 7. Single Phase Fully Controlled Bridge Convertor using Four Thyristors. 8. 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 | S | 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** | | **0** | **0**  **2025-2026** | | **5** | **4** |
| **Pre-requisite** | | | **Basic Concepts in Electronics** | **Syllabus Version** | | |  | | |
| **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**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and Computer programming** | **Syllabus Version** | | | | |  | | |
| **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** | |  | **DIGITAL IMAGE PROCESSING** | | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Core** | | | **4** | | **0**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | **Familiarity with mathematics and digital**  **signal processing** | **Syllabus**  **Version** | | | | |  | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main objectives of this course are to:   1. Introduce the fundamental concepts and techniques in digital image processing and their applications. 2. Emphasize on the Image Transforms, Image Enhancement, Restoration and Compression, Image segmentations and Image Analysis. 3. Improve the students ability to use mathematical tools required for the design and development of image processing algorithms to solve image processing problems. | | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | Understand the general terminology, basic concepts of digital image processing | | | | | | | | | K2 | |
| 2 | Develop various types of image transformation algorithms and image spatial  filtering algorithms | | | | | | | | | K3 | |
| 3 | Apply 2D image processing transforms and their properties for various image  processing problems in frequency domain | | | | | | | | | K3 | |
| 4 | Estimate various image compression, image encoding and image representation  methods and algorithm requirements for practical image processing applications. | | | | | | | | | K5 | |
| 5 | Design and Develop procedure for solving image processing problems. | | | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
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| **Unit:1** | | **DIGITAL IMAGE FUNDAMENTALS** | | | | | **12 hours** | | | | |
| Introduction to Digital Image Processing – The Origins of Digital Image Processing – Fields that use digital image processing – Fundamental steps in digital image processing; Components of an image processing system – Structure of the Human eye – Image formation in the eye – Brightness adaptation and discrimination – Simultaneous contrast – Image sensing and Acquisition – Concepts in Sampling and Quantization – Representing Digital images – Spatial and Intensity resolution – Neighbors of pixel – Adjacency – Connectivity – Regions –  Boundaries – Distance measures. | | | | | | | | | | | |
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| **Unit:2** | | **IMAGE ENHANCEMENT** | | | | | **12 hours** | | | | |
| Spatial domain methods – Frequency domain methods – Enhancement by point processing – Intensity transformations – Image Negatives – Contrast stretching – Thresholding – Intensity level slicing – Bit plane slicing – Histogram processing; Histogram equalization – Spatial Filtering – Smoothing Spatial filters: Low pass filtering – Median filtering – Sharpening Spatial  Filters: High pass filtering – Derivative filters. | | | | | | | | | | | |
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| **Unit:3** | | **IMAGE TRANSFORMS** | | | **12 hours** | | | | | | |
| Introduction – Fourier transform – 2D Discrete Fourier Transform – Properties of 2-D DFT and IDFT: Separability, Shift, Periodicity, Convolution, Correlation, Scaling, Conjugate symmetry, Orthogonality, Rotation – Other Image Transforms – Discrete Cosine Transform – Walsh  transform – Hadamard transform –Comparison of different image transforms. | | | | | | | | | | | |

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| **Unit:4** | | **IMAGE COMPRESSION** | **11 hours** |
| Image Compression Fundamentals – Redundancies – Objective and subjective fidelity criteria – Image Compression models – General image compression system – Huffman Coding – Run length coding – Bit plane coding – Transform coding – Predictive coding – Lossless predictive  coding - Lossy predictive coding – Delta modulation coding – DPCM coding. | | | |
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| **Unit:5** | | **IMAGE SEGMENTATION AND REPRESENTATION** | **11 hours** |
| Edge based segmentation – Region based segmentation – Point, Line, and Edge detection: Detection of isolated points – Line detection – Gradient operators – Segmentation by Region growing and by Region splitting and Merging – Edge linking and Boundary detection – Feature extraction – Boundary preprocessing – Boundary representation – Chain codes – Shape  numbers. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Various Image transformation techniques | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, Pearson, 2018. | | |
| 2 | S. Jayaraman, S. Esakkirajan and T. Veerakumar, “Digital Image Processing”, Tata  McGraw Hill, New Delhi, 2010. | | |
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| **Reference Books** | | | |
| 1 | Anil K. Jain, “Fundamentals of Digital Image Processing”, Prentice-Hall of India Private  Limited, New Delhi, 2006. | | |
| 2 | Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins., Digital Image Processing  Using MATLAB, 3rd edition, Gatesmark Publishing, 2020 | | |
| 3 | S. Annadurai, R.Shanmugalakshmi, “Fundamentals of Image Processing” Pearson  education, 2007 | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://swayam.gov.in/nd1_noc20_ee75/> | | |
| 2 | <https://swayam.gov.in/nd1_noc20_ee83/> | | |
| 3 | <http://www.imageprocessingplace.com/> | | |
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| **Course Designed By:** Mrs.S.Sangeethavanathi, Dept. of Electronics, Sri Vasavi College, Erode. | | | |

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

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

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| **Course code** | | |  | **PC HARDWARE AND TROUBLESHOOTING** | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | | **4** | | **0**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Computer Hardware and Troubleshooting Techniques** | **Syllabus Version** | | | |  | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main Objectives of this course are to:   1. Learn concept & structure of Computer Hardware & Networking Components 2. Identify the existing configuration of the computers & peripherals. 3. Learn PC maintenance, Upgrading and Troubleshooting skills | | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | Understand basic concept & structure of Computer Hardware & Networking  Components. | | | | | | | | K2 | | |
| 2 | Familiarize themselves with PC memory devices and Peripherals such as  RAM, ROM, HDD, SSD, Mouse, Keyboard, Monitor devices. | | | | | | | | K2 | | |
| 3 | Know about motherboard I/O interfacing ports such as SATA, PATA, IDE,  USB, VGA, HDMI and others will be familiar to the students. | | | | | | | | K2 | | |
| 4 | Familiarize themselves with the various tools available in Windows or  provided by third-party companies that helps in PC troubleshooting and maintenance. | | | | | | | | K4 | | |
| 5 | Apply their knowledge about computer peripherals to identify/rectify  problems on board. | | | | | | | | K3 | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
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| **UNIT: 1** | | **INTRODUCTION TO PC HARDWARE AND NETWORK**  **DEVICES** | | | | | **11 hours** | | | | |
| History and Generations of the computer – Components of IBM PC – CPU – Motherboard & Form Factors – Intel & AMD Processors (32 & 64 bit) – BIOS Setup - SMPS & UPS – Power Connectors – Hub & Switches – Routers – Modem – Fiber Optic Devices – Cables and  Connector Types. | | | | | | | | | | | |
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| **UNIT: 2** | | **MEMORY DEVICES** | | | | | **12 hours** | | | | |
| Memory types – RAM – ROM – Floppy Disk Drive (FDD) – Optical Disk Drive (ODD) – Hard  Disk Drive (HDD) – Solid State Drive (SSD) – USB Drives – External Flash Memory Device – Physical & Logical Formatting. | | | | | | | | | | | |
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| **UNIT: 3** | | **PERIPHERALS** | | | | | **12 hours** | | | | |
| Keyboard, Mouse (wire & wireless) – Monitors (CRT,LCD,LED) – Printers – Scanners – Webcams – Speakers and Audio Devices – Sound and Graphics Cards – Joystick – Touchpad &  Touch Screen – LCD, LED Projectors – Smart Devices – WiFi LAN Card – Plotters. | | | | | | | | | | | |
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| **UNIT: 4** | | **I/O PORTS AND INTERFACING** | | | | | **11 hours** | | | | |
| PS/2 Port – Serial & Parallel Ports – USB Ports – VGA Port – DVI Port – HDMI Port – Audio  & Mic Jack – Ethernet Port – SCSI Interface – IDE/PATA Interface – SATA Interface – PCI Slot – PCI Express Slot. | | | | | | | | | | | |

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| **UNIT: 5** | | **TROUBLESHOOTING** | **12 hours** |
| Troubleshooting Procedures – General Hardware Problems – Basic Software Problems – Motherboard Problems – HDD failure Testing – SMPS problems – Keyboard / Mouse Problems  – Monitor Problems – Speeding up a Slow Computer – IPv4 and IPv6 configuration & Network Problems. | | | |
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| **UNIT: 6** | | **Contemporary Issues** | **2 hours** |
| Networking and Interfacing with PC | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | B. Govindarajulu “IBM PC AND CLONES”, Tata McGraw-Hill Publishing Company  Limited, 2008. | | |
| 2 | K.L.James, “COMPUTER HARDWARE: Installation, Interfacing, Troubleshooting and  Maintenance”, PHI Learning Private Limited, 2013. | | |
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| **Reference Book(s)** | | | |
| 1 | N. Mathivanan “MICROPROCESSORS, PC HARDWARE AND INTERFACING”,  PHI Learning Private Limited (2003). | | |
| 2 | Michael W. Graves “A+ GUIDE TO PC HARDWARE MAINTENANCE AND REPAIR”,  Thomson Delmar Learning (2004). | | |
| 3 | Peter Norton “INSIDE THE IBM PC AND PS/2”, PHI Publishers, 4th Edition (1991). | | |
| 4 | Stephen J Bigelow “TROUBLESHOOTING MAINTAINING AND REPAIRING PC’s”,  Tata McGraw-Hill Publishing Company Limited; 2nd Edition (2000). | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://swayam.gov.in/nd2\_cec20\_cs11/preview | | |
| 2 | https:/[/www.ibm.com/support/home](http://www.ibm.com/support/home) | | |
| 3 | https://urbanareas.net/info/training/computer-repair | | |
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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 | S | S | M | S |
| **CO2** | M | S | S | S | S |
| **CO3** | S | M | S | S | M |
| **CO4** | S | S | S | S | S |
| **CO5** | S | S | M | S | S |

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

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| **Course code** | | |  | **NANO ELECTRONICS AND TECHNOLOGY** | | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | | **4** | | **0**  **2025-2026** | | **0** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Nano Science and**  **Characterization Techniques** | **Syllabus**  **Version** | | | |  | | |
| **Course Objectives:** | | | | | | | | | | | |
| The main Objectives of this course are to:   1. To introduce the students to Nano Electronics, Nano Devices, and Nano Materials. 2. To identify characterization Techniques behind Nano Electronics. 3. To describe the principle and the Applications of Nano Electronic Devices | | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | | |
| 1 | Learn about the background on Nanoscience and Technology | | | | | | | | K2 | | |
| 2 | Explain the importance of reduction in materials dimensionality, and its  relationship with materials properties | | | | | | | | K2 | | |
| 3 | Understanding the principles and various Characterization Techniques | | | | | | | | K2 | | |
| 4 | Apply the students the essential role of Nanoscience and Systems | | | | | | | | K3 | | |
| 5 | Apply their learned knowledge to develop Nano Devices and Applications | | | | | | | | K3 | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | | |
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| **UNIT: 1** | | **INTRODUCTION AND CLASSIFICATION** | | | | | **11 hours** | | | | |
| Classification of Nanostructures – Nanoscale Architecture – Effects of the Nanometre Length Scale – Changes to the System Total Energy – System Structures – Vacancies in Nanocrystals – Effect of Nanoscale Dimensions on Various Properties – Structural, Thermal, Chemical, Mechanical, Magnetic, Optical and Electronic Properties – Effect of Nanoscale Dimensions on  Biological Systems. | | | | | | | | | | | |
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| **UNIT: 2** | | **NANOMATERIALS PREPARATION METHODS** | | | | | **12 hours** | | | | |
| Fabrication Methods – Top Down Processes – Milling, Lithographics, Machining Process – Bottom up Process – Vapour Phase Deposition Methods – Plasma-Assisted Deposition Process – Liquid Phase Methods – Colloidal and SolGel Methods – Methods for Templating the Growth  of Nanomaterials – Ordering of Nanosystems – Self-Assembly and Self-Organization – Preparation, Safety and Storage Issues. | | | | | | | | | | | |
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| **UNIT: 3** | | **CHARACTERIZATION TECHNIQUES** | | | | | **12 hours** | | | | |
| General Classification of Characterization Methods – Analytical and Imaging Techniques – Microscopy Techniques – Electron Microscopy – Scanning Electron Microscopy – Transmission Electron Microscopy – FESEM – Scanning Tunneling Microscopy – Atomic Force Microscopy – X Ray Diffraction – Absorption Spectroscopy – Photo-Luminescence –  Raman Spectroscopy. | | | | | | | | | | | |
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| **UNIT: 4** | | **NANO ELECTRONICS AND INTEGRATED SYSTEMS** | **11 hours** |
| Basics of Nano Electronics – Single Electron Transistor – Quantum Computation – Tools of  Micro Nano Fabrication – Nanolithography – Quantum Electronic Devices – MEMS – NEMS – Dynamics of NEMS – Limits of Integrated Electronics. | | | |
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| **UNIT: 5** | | **NANODEVICES AND APPLICATIONS** | **12 hours** |
| Nano Magnetic Materials – Particulate Nano magnets – Geometrical Nano magnets – Magneto Resistance – Probing Nano magnetic Materials – Nano magnetism in Technology – Carbon Nanotubes – Fabrication – Applications – Organic FET – Organic LED’s – Organic Photovoltaics – Injection Lasers – Quantum Cascade Lasers – Optical Memories – Electronic  Applications. | | | |
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| **UNIT: 6** | | **Contemporary Issues** | **2 hours** |
| General Classification of Characterization Methods | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Kelsall Robert W, Ian Hamley, Mark Geoghegan, “Nanoscale Science and Technology”,  Wiley Eastern, 2004. | | |
| 2 | C.P. Poole, F.J.Owens, “Introduction to Nanotechnology”, John Wiley & Sons, 2003. | | |
| 3 | Michael Kohler, Wolfgang, Fritzsche, “Nanotechnology: Introduction to Nanostructuring  Techniques”, John Wiley & Sons, 2008. | | |
|  | | | |
| **Reference Book(s)** | | | |
| 1 | Mark Ratner, Danial Ratner, “Nanotechnology: A Gentle Introduction to the Next Big Idea,  Pearson (2003). | | |
| 2 | Jan Korvink & Andreas Greiner, “Semiconductors for Micro and Nanotechnology – An  Introduction for Engineers”, Weinheim Cambridge: Wiley-VCH, 2001. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | https://swayam.gov.in/nd1\_noc19\_mm21/preview | | |
| 2 | <http://home.iitk.ac.in/~kbalani/doc/Nanostructures_and_Nanomaterials.pdf> | | |
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| **Course Designed By:** Dr. P. Gowthaman, Dept. of Electronics, Erode Arts and Science 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** | | |  | **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 | | | | | | | | | | | |
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| **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 | | | | | | | | | | | |
|  | | | | | | | | | | | |
| **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 | | | | | | | | | | | | |
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| **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** | | |  | **PC HARDWARE AND VHDL PROGRAMMING LAB** | | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core Practical** | | **0** | **0**  **2025-2026** | | **4** | **4** |
| **Pre-requisite** | | | | **Computer Hardware Troubleshooting and VHDL Simulation Software’s** | **Syllabus Version** | | |  | | |
| **Course Objectives:** | | | | | | | | | | |
| The main Objectives of this course are to:   1. Acquire skills in installing different subsystem and troubleshooting techniques (Power supply, Video display unit, C.P.U., Printer, Plotter, Graphic monitor, Disc drives etc.). 2. Provides the necessary knowledge and skills regarding working construction, interfacing and networking aspects of computer peripherals 3. 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 | Troubleshoot common problems related to internal components such as  motherboards, RAM, CPU, and power with appropriate tools | | | | | | | K5 | | |
| 2 | Identify and analyze the problems in Computer systems, software installation  and Networking related rectification | | | | | | | K4 | | |
| 3 | Design and simulate list of combinational and sequential digital circuits using  simulation software’s - VHDL language | | | | | | | K3 | | |
| 4 | Analyze, design and develop a system/component/ process for the required  needs under the realistic constraints | | | | | | | K4 | | |
| 5 | Design the digital systems through VHDL programming | | | | | | | K6 | | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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|  | | **List of Experiments**  **(Any 6 Experiments)** | | | | | **30 hours** | | | |
| **PC HARDWARE**   1. Configuration of CMOS / BIOS Setup 2. Assembling and Disassembling of Desktop PC 3. Installation of Operating Systems [OS] using Bootable CD/DVD 4. Install Multiple Operating Systems (Windows & Linux) in One Computer using Bootable USB Drive 5. Installation of Driver, Application & Security Software's 6. HDD Formatting & Partitioning using Various Methods 7. Connect Computers with Peer-to-Peer Network using Wi Fi configuration 8. Sharing Folders & Remote Desktop connection using Crimped Network Cables 9. Installation and Configuration of Network Printer / Scanner 10. Smart Device Interfacing with PC (wired & wireless) 11. Speed Control of DC Motor using PC 12. Interfacing with Serial, Parallel and USB ports | | | | | | | | | | |

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|  | **List of Experiments (Any 6 Experiments)** | **30 hours** |
| **VHDL PROGRAMMING**   1. Simple Logic Gates 2. Half Adder and Full Adder 3. Half Subtractor and Full Subtractor 4. Encoder and Decoder 5. Multiplexer and Demultiplexer 6. Solving Boolean Equations 7. Flip - Flops 8. Digital Counters 9. Shift Registers and Ring Counter 10. 4 bit and 8 bit Multiplier 11. Arithmetic and Logic Unit 12. Implementation of Simple Programs in CPLD or FPGA kit | | |
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|  | **Total Practical Hours** | **60 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 | 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** | | |  | **DSP AND DIP LABORATORY** | **L** | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Core** | **0** | **0** | | **4** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in digital signal processing techniques** | **Syllabus Version** | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. Design and apply digital signal processing techniques to design discrete time systems and digital filter 2. Compile and solve the digital signal processing problems using MAT lab. 3. Interpret to analyze the importance of various transformation techniques in signal processing | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Enumerate the basic concepts of signals and systems and their interconnections  in a simple and easy-to-understand manner using MATLAB | | | | | | | K4 | |
| 2 | Design FIR and IIR filters | | | | | | | K6 | |
| 3 | Process images using techniques of smoothing, sharpening, histogram  processing, and filtering | | | | | | | K5 | |
| **K1** – Remember; **K2** – Understand; **K3** – Apply; **K4** – Analyze; **K5** – Evaluate; **K6** – Create | | | | | | | | | |
|  | | | | | | | | | |
|  | | **List of Experiments (Any 6 Experiments)** | | | | | **30 hours** | | |
| **USING Digital Signal Processor**   1. Study of Addressing Modes of DSP using simple examples 2. Arithmetic Operations 3. DFT Computations 4. FFT Computations 5. Convolution of Two Discrete Signals 6. Correlation of Two Discrete Signals 7. Waveform Generation 8. Solving Differential Equations 9. Solving Z-Transform 10. Voice Storing & Retrieval 11. FIR Filter Design 12. IIR Filter Design | | | | | | | | | |
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|  | **List of Experiments (Any 6 Experiments)** | | | **30 hours** |
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| **SIMULATION USING MATLAB**   1. Generation of signals 2. Amplitude Modulation & FFT response 3. Impulse, Step, Exponential & Ramp functions 4. Frequency Sampling method 5. Design of FIR filter 6. Design of IIR filter 7. Image Sampling – Zooming & Shrinking operations 8. Basic Gray Level Transformations: Image negative, Power law and Log transforms 9. 2-D Discrete Fourier Transform and Walsh Transform 10. Image Contrast Enhancement by Histogram equalization technique 11. Spatial Image Filtering: Low pass and High pass filtering | | | | |
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|  | | **Total Practical Hours** | **60 hours** | |
| **Course Designed By:** Mr. 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 | M | M | S |
| **CO3** | S | S | S | S | S |

\*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** | |  | **ELECTRONIC TEST INSTRUMENTS** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester I: Elective - Group-B** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and**  **instrumentation** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To introduce students to monitor, analyze and control any physical system. 2. To understand students how different types of meters work and their construction 3. To provide a student a knowledge to design and create novel products and solutions for real life problems. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand operation of different instruments. | | | | | | | | K2 | |
| 2 | Describe different terminology related to measurements | | | | | | | | K1 | |
| 3 | Indentify the principles of various types of transducers and sensors. | | | | | | | | K3 | |
| 4 | Employ appropriate instruments to measure given sets of parameters, and  practice the construction of testing and measuring set up for electronic systems. | | | | | | | | K5 | |
| 5 | Measurement of R,L,C ,Voltage, Current, Power factor , Power, Energy | | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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| **Unit:1** | | **ANALOG METERS** | | | | **10 hours** | | | | |
| D.C,A.C voltmeters, ammeters, multimeter, power meter, Q-meter, true RMS meter,  vector impedance meter, vector voltmeter, component measuringinstrument. | | | | | | | | | | |
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| **Unit:2** | | **SIGNAL SOURCES** | | | **12 hours** | | | | | |
| Sine wave generator- Frequency synthesized sine wave generator- Sweep frequency generator, pulse and square wave generator-Function generator- Wave analyzer- Applications- Harmonic distortion analyzer- Spectrum analyzer- Applications- Audio Frequency generator- Noise generator. | | | | | | | | | | |
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| **Unit:3** | | **OSCILLOSCOPES** | | | **12 hours** | | | | | |
| General purpose oscilloscope-Screens for CRT -Vertical & horizontal deflection systems- Time base operation, triggers – sweep control, z axis input – Delay line-Multiple trace- Dual beam & dual trace-Probes-Oscilloscope techniques-special oscilloscopes- Storage oscilloscope-sampling oscilloscope-digital CRO. | | | | | | | | | | |
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| **Unit:4** | | **DIGITAL INSTRUMENTS** | | | **12 hours** | | | | | |
| Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count-Digital voltmeter-Types-Automatic polarity indication, automatic ranging, and auto zeroing-DMM-Microprocessor based DMM-DPM-swept – spectrum analyzer-network analyzer- discharge analyzer- logic probes-logic analyzer. | | | | | | | | | | |
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| **Unit:5** | | **DISPLAY AND RECORDING DEVICES** | **12 hours** |
| Bar graph display-Segmental and dot matrix display-X-Y recorders, magnetic tape recorders- Digital recording-Data loggers-Interference and screening-Electrostatic and electromagnetic interference & earth loops. | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** |
| Sensors and Transducers- LVDT- Piezoelectric Transducers | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Albert D.Herlfrick & William D.Cooper, “Modern Electronic Instrumentation & Measurement Techniques” Prentice Hall of India,2002. | | |
| 2 | A.J.Bouwens,’Digital Instrumentation” Tata Mc Graw Hill, 1997. | | |
| 3 | RobertA.Witte,’Electronic Test Instruments, Theory and applications’ Prentice Hall, 1993. | | |
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| **Reference Books** | | | |
| 1 | B.M.Oliver and J.M.Cage, ”Electronic Measurements & Instrumentation”, McGraw Hill International Edition, 1975. | | |
| 2 | Joseph, J.Carr, “Elements of Electronic Instrumentation & Measurements”, Pearson, 2003. | | |
| 3 | C.S.Rangan, G.R.sarma, V.S.V.Mani,” Instrumentation Devices & systems” Tata Mc Graw  Hill, 2002. | | |
| 4 | D.A.Bell, “Electronic Instrumentation and Measurements”, Prentice Hall of India, 2002. | | |
| 5 | Rajendra Prasad, “Electronic Measurements and Instrumentation”, Khanna Publishers, 2003 | | |
| 6 | B.R.Gupta, “Electronics and Instrumentation”, S.Chand Co. (P)Ltd., Delhi, 1999. | | |
|  | | | |
| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://nptel.ac.in/courses/108/105/108105153/> | | |
| 2 | <https://swayam.gov.in/nd1_noc19_ee44/preview> | | |
| 3 | [https://eladiaqu.firebaseapp.com/aa995/electronic-test-instruments-analog-and-digital-](https://eladiaqu.firebaseapp.com/aa995/electronic-test-instruments-analog-and-digital-measurements-2nd-edition-by-robert-a-witte-0130668303.pdf)  [measurements-2nd-edition-by-robert-a-witte-0130668303.pdf](https://eladiaqu.firebaseapp.com/aa995/electronic-test-instruments-analog-and-digital-measurements-2nd-edition-by-robert-a-witte-0130668303.pdf) | | |
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| **Course Designed By:** Mr.S.Vigneswaran, 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 | S | M |
| **CO2** | S | M | S | L | M |
| **CO3** | M | S | M | M | S |
| **CO4** | M | M | S | M | L |
| **CO5** | S | M | M | S | M |

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

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| **Course code** | |  | **ANALYTICAL INSTRUMENTATION** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester II: Elective - Group-B** | **4** | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and**  **instrumentation** | **Syllabus**  **Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | |
| The main objectives of this course are to:   1. To apply the principles and theory of instrument analysis. 2. To teach the student the correct operation of instruments. 3. To introduce the student to the techniques of troubleshooting instruments in the laboratory. | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | |
| 1 | Understand the effects of different constituent in a process outcome and  analysis the performance of various on-line or off-line instruments. 3. 4. 5.. 6. | | | | | | | K2 | |
| 2 | Apply the knowledge of chromatography to Separates the constituents from a  complex mixture. | | | | | | | K3 | |
| 3 | Describe and differentiate between online and offline process and Identifies  suitable instruments for analysis gaseous, liquid or solid substance. | | | | | | | K4 | |
| 4 | Decide the dominate frequency characterize the substance from spectrum  analysis | | | | | | | K5 | |
| 5 | Perform experimental analysis for different offline test like humidity, moisture,  dissolve oxygen etc. | | | | | | | K6 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | |
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| **Unit:1** | | **COLORIMETRY AND SPECTROPHOTOMETRY** | | | **11 hours** | | | | |
| Special methods of analysis- Beer-Lambert law-colorimeters - UV-ViS spectrophotometers- Single and double beam instruments-Sources and detectors-IR Spectrophotometers-Types- Attenuated total reflectance flame photometers- Atomic absorption spectrophotometers-sources  and detectors-FTIR spectrophotometers-Flame emission photometers. | | | | | | | | | |
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| **Unit:2** | | **CHROMOTOGRAPHY** | | | **12 hours** | | | | |
| Different techniques- Gas chromatography- Detectors- Liquid chromatographs-  Applications - High pressure liquid chromatographs-Applications. | | | | | | | | | |
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| **Unit:3** | | **INDUSTRIAL GAS ANALYZERS AND POLLUTION**  **MONITORING INSTRUMENTS** | | | **12 hours** | | | | |
| Types of gas analyzers-Oxygen, NO2 and H2S types, IR analyzers, thermal conductivity analyzers, analysis based on ionization of gases. Air pollution due to carbon monoxide,  hydrocarbons, nitrogen oxides, sulphur dioxide estimation-dust and smoke measurements. | | | | | | | | | |
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| **Unit:4** | | **PH METERS AND DISSOLVE COMPONENT**  **ANALYZERS** | | | **12 hours** | | | | |
| Principle of pH measurement, glass electrodes, hydrogen electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors, dissolved oxygen analyzer- sodium  analyzer-silicon analyzer. | | | | | | | | | |

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| **Unit:5** | | **RADIO CHEMICAL AND MAGNETIC RESONANCE TECHNIQUES** | | **11hours** |
| Nuclear radiations – Detectors - GM Counter - Proportional counter - Solid state detector - Gamma cameras - X-ray spectroscopy - Detectors- Diffractometers -Absorption meters - Detectors NMR-Basic principles-NMR spectrometer-Applications. | | | | |
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| **Unit:6** | | **Contemporary Issues** | **2 hours** | |
| Mass spectrometers - Different types - Applications | | | | |
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|  | | **Total Lecture Hours** | **60 hours** | |
| **Text Book(s)** | | | | |
| 1 | R.S.Khandpur, ”Handbook of Analytical Instruments ”Tata Mc-Graw Hill  publishing Co. Ltd.2003. | | | |
| 2 | H.H.Willard, L.L.Merrit, J.A.Dean, F.A.Settle,”Instrumental methods of  analysis” CBS publishing & distribution, 1995. | | | |
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| **Reference Books** | | | | |
| 1 | Robert D.Braun, ”Introduction to Instrumental Analysis” Mc Graw Hill,  Singapore,1987 | | | |
| 2 | G.W.Ewing,”Instrumental Methods of Analysis” Mc Graw Hill 1992. | | | |
| 3 | DA Skoog and D.M.West,”Prinicples of Instrumental Analysis” Harper and Row  publishers,1974. | | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | |
| 1 | <https://www.my-mooc.com/en/mooc/analyticalchem/> | | | |
| 2 | <https://swayam.gov.in/nd2_cec20_bt22/preview> | | | |
| 3 | [https://webstor.srmist.edu.in/web\_assets/srm\_mainsite/files/files/IC0309%20Analytical%2](https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/IC0309%20Analytical%20Instumentation.pdf)  [0Instumentation.pdf](https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/IC0309%20Analytical%20Instumentation.pdf) | | | |
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| **Course Designed By:** Mr.S.Vigneswaran, 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 | S | M |
| **CO2** | S | M | S | L | M |
| **CO3** | M | S | M | M | S |
| **CO4** | M | M | S | M | L |
| **CO5** | S | M | M | S | M |

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

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| **Course code** | |  | **VIRTUAL INSTRUMENTATION** | **L** | | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | **Semester III: Elective - Group-B** | **4** | | | **0** | | **0** | **4** |
| **Pre-requisite** | | | **Basic knowledge in Electronics and**  **Instrumentation** | **Syllabus**  **Version** | | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To provide basic concepts in virtual instruments 2. To know about the programming methods in software used in virtual instrumentation 3. To familiarize the students with the applications of virtual instrumentation | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Understand the basics concepts and programming in virtual instrumentation | | | | | | | | K2 | |
| 2 | Apply virtual instrumentation tool set for a given problem | | | | | | | | K3 | |
| 3 | Describe about virtual instrumentation | | | | | | | | K1 | |
| 4 | Get an adequate knowledge application of virtual instrumentation | | | | | | | | K2 | |
| 5 | Apply virtual instrumentation concept for a given applications | | | | | | | | K5 | |
| **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** | | | | **12 hours** | | | | |
| LabVIEW - 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 - | | | | | | | | | | |

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| Real time Data Acquisition. | | | |
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| **Unit:5** | | **LABVIEW APPLICATIONS** | **11 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** |
| Sequence-Style State Machine, Test Executive-Style State Machine | | | |
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|  | | **Total Lecture Hours** | **60 hours** |
| **Text Book(s)** | | | |
| 1 | Garry M Johnson, "Lab view Graphical Programming", Tata McGraw Hill, New Delhi, 1996. | | |
| 2 | Robert H.Bishop,”Learning with Lab-View” Prentice Hall,2003. | | |
| 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, 1996. | | |
| 2 | Barry Paron, "Sensor, Transducers and Labview", Prentice Hall, New Delhi, 2000. | | |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | |
| 1 | <https://www.pdfdrive.com/virtual-instrumentation-using-labview-d184554798.html> | | |
| 2 | [https://wwwusers.ts.infn.it/~rui/univ/Acquisizione\_Dati/Lezioni/VIII%20-](https://wwwusers.ts.infn.it/~rui/univ/Acquisizione_Dati/Lezioni/VIII%20-%20Labview%20-%20Introduction/LabVIEW%20Introduction-SixHour.pdf)  [%20Labview%20-%20Introduction/LabVIEW%20Introduction-SixHour.pdf](https://wwwusers.ts.infn.it/~rui/univ/Acquisizione_Dati/Lezioni/VIII%20-%20Labview%20-%20Introduction/LabVIEW%20Introduction-SixHour.pdf) | | |
| 3 | <https://vignan.ac.in/subjectsnew/MT330.pdf> | | |
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| **Course Designed By:** Mr.S.Vigneswaran, Department of Electronics, Sri Vasavi College, Erode. | | | |

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

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

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| **Course code** | | |  | **INSTRUMENTATIONLAB** | **L** | | **T** | | **P** | **C** |
| **Core/Elective/Supportive** | | | | **Semester IV: Elective - Group-B** | **0** | | **0** | | **5** | **4** |
| **Pre-requisite** | | | | **Basic knowledge in Electronic instruments** | **Syllabus**  **Version** | | | **2025-2026** | | |
| **Course Objectives:** | | | | | | | | | | |
| The main objectives of this course are to:   1. To learn how to visualize and work on laboratory and multidisciplinary tasks. 2. To demonstrate various Bridges &sensors using simulation and hardware set ups. 3. To Measure Voltage, Current, Power factor, Power, Energy. | | | | | | | | | | |
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| **Expected Course Outcomes:** | | | | | | | | | | |
| On the successful completion of the course, student will be able to: | | | | | | | | | | |
| 1 | Demonstrate variety of practical electrical circuits and conduct experiments to  analyze and interpret data. | | | | | | | | K2 | |
| 2 | Identify various measuring equipments/meters and to predict correctly their  expected performance through different calibration methods. | | | | | | | | K1 | |
| 3 | Differentiate the working principle and use of PMMC and moving iron type  instruments. | | | | | | | | K4 | |
| 4 | Measure Resistance, Inductance, Capacitance, Frequency, Voltage, Current, Power  and Energy. | | | | | | | | K3 | |
| 5 | Prepare graphical presentations of laboratory data and computational results,  incorporating standard data analysis methods to develop technically sound reports of outcomes | | | | | | | | K5 | |
| **K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create | | | | | | | | | | |
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|  | | **List of Experiments (Any 6 Experiments)** | | | | **40 hours** | | | | |
| 1. Simple fault finding of pH meters and Identification different type pHelectrodes. 2. Displacement measurement using LVDT 3. Design of V-F and F-V converter 4. Instrumentation amplifier 5. Study of Strain gauges. 6. Thermocouple Compensation. 7. Thermistor Linearization transmitter design. 8. Pressure Calibration. 9. Signal conditioning circuit for any resistive / pressure transducer. 10. Signal conditioning circuit for optical encoder. | | | | | | | | | | |

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|  | | **List of Experiments (Any 6 Experiments)** | | **35 hours** |
| **USING LAB VIEW**   1. Creating a simple VI to place a Digital Control 2. Navigation and Editing VI to make a Degree C to Degree F Converter 3. Converting VI in to Sub VI 4. Write a programme to count Modulus 32 and display the values in decimal, octal decimal and Binary. 5. Built a VI using while loop that displays random numbers in to three wave form charts. (Strip, scope & Sweep) 6. Data Acquisition using Lab VIEW 7. Development of Temperature Measurement using Lab VIEW 8. Development of Virtual Instrument for Function Generator using LabVIEW 9. Development of Virtual Instrument for Audio Signal Spectrum Analyzer using Lab VIEW. | | | | |
|  | | | **Total Practical Hours** | **75 hours** |
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| **Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]** | | | | |
| 1 | <https://www.mesce.ac.in/pdf/Instrumentation%20Lab.pdf> | | | |
| 2 | [http://www.atri.edu.in/images/pdf/departments/INSTRUMENTATION%20LAB%20manu](http://www.atri.edu.in/images/pdf/departments/INSTRUMENTATION%20LAB%20manual.pdf)  [al.pdf](http://www.atri.edu.in/images/pdf/departments/INSTRUMENTATION%20LAB%20manual.pdf) | | | |
| 3 | <https://www.amu.ac.in/emp/studym/99993346.pdf> | | | |
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| **Course Designed By:** Mr.S.Vigneswaran, Department of Electronics, Sri Vasavi College, Erode. | | | | |

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

# 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