Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024 – 25)
Semester V – (DSE - 1A)

Course Name: Digital Electronics & Microprocessor Course Code: EL524A(60 Hours)
HPW: 4 **Credits: 4**

Course Objectives: The objective of this course is to -
COB1: *learn - logic gates, Boolean algebra and Karnaugh maps for designing digital circuits.*
COB2: *study combinational Logic circuits - Adders, multiplexers, encoders, etc.*
COB3: *study sequential Logic circuits - flip-flops, registers and counters.*
COB4: *become familiar with the terms - Arithmetic Logic Unit, Control Unit, Registers, Bus, Von Neumann & Harvard architecture.*

Unit- I **(15Hrs)**

Number system and Logic gates: Conversions of binary, octal, decimal & hexadecimal number systems, binary addition and subtraction (1's and 2's complement methods).

Logic gates – AND, OR, NOT, NAND, NOR, XOR gates and their truth tables – Design of basic gates using the Universal gates - NAND and NOR, Half adder, Full adder and parallel adder logic circuits. Logic families and their characteristics – TTL, CMOS circuits.

Unit-II **(15Hrs)**

Boolean algebra and Combinational logic circuits: Boolean algebra – Laws and identities, DeMorgan's Theorems. Simplification of Boolean expressions using Boolean identities - Reduction of Boolean expressions using Karnaugh Maps – Sum of Products (SOP) representation (up to 4 variables). Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder (8 to 3).

Unit-III **(15Hrs)**

Sequential logic circuits: Flip – flops – SR, D, JK, T and Master – Slave JK; Registers - Shift Registers SISO and SIPO Registers.

Counters: 4-bit Asynchronous (Ripple) counter, Modulo – N counter, Synchronous counter. Up/down counters – ripple counter IC7493 – Decade counter IC7490 – working, truth tables and timing diagrams.

Unit-IV **(15Hrs)**

Introduction to 8085 Microprocessor & its architecture:
Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle, Execute cycle (Timing diagram). Interrupts – Hardware and Software, Address space partitioning – Memory mapped I/O & I/O mapped I/O.
Instruction set of 8085 microprocessors: Classification of Instructions – Data transfer, Arithmetic, logical, Branch, I/O and Machine control. Addressing modes, Stack and Subroutines, Programming examples – Addition, Subtraction, Multiplication and Division.

17/4/25
CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri

25/04/25
Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Course Outcomes: Upon Successful completion of this course, students will be able to -

CO1: *use various number systems for application in digital circuits.*
CO2: *analyse various combinational and sequential circuits.*
CO3: *design sequential circuits – registers and counters.*
CO4: *summarize terms applicable to microprocessors, write programs using Assembly language.*

Recommended Books:

1. Digital Electronics by William H. Gothmann, *Prentice Hall.*
2. Digital logic Digital Design by Morris Mano, *PHI.*
3. Microprocessor Architecture, Programming and Applications with 8085 by Ramesh S. Gaonkar, *Penram International Publications.*

Reference Books:

1. Principles of Digital Electronics by Malvino& Leach, *TMH.*
2. Fundamentals of Microprocessors & Microcomputers by B. Ram, *Dhanpat Rai Publications.*
3. Introduction to Microprocessors - Aditya P. Mathur, TMH.
4. Theory and Problems of Microprocessor fundamentals-2nd Edition Roger L, Tokheim, *Schaum's outline series, McGraw Hill.*
5. Microprocessors, Interfacing and Applications by R.Singh and B.P.Singh, *New Age International.*

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Semester V

Course Name: Digital Electronics & Microprocessor Lab **Course Code: EL524AP**

HPW: 2 **Credits: 1**

Course Objectives: The objective of this course is to -
COB1: *know the concepts of Combinational circuits.*
COB2: *understand the concepts of flipflops, registers and counters.*
COB3: *introduce the programming procedure with 8085 microprocessor kit.*

Digital electronics

1. Verification of truth tables of AND, OR, NOT, NAND, NOR, EXOR Gates using IC 74XX series.
2. Construction of basic gates using NAND and NOR gates.
3. Construction of Half Adder & Full Adder using gates. Verification of truth table.
4. Verification of truth tables of flip flops: RS, D and JK using IC's.
5. Construction of binary counters using 7490 &7493

Simulation experiments:

1. 4-bit parallel adder using full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Up/down counter using 7493& 7490
5. Multiplexer/De-Multiplexer.

Microprocessor (ALP)

1. Binary addition & subtraction.
2. Multiplication & Division.
3. Decimal addition (DAA) & Subtraction.
4. Using subroutines - Pi value up to 5 decimal places

Course Outcomes: *Upon successful completion of this course, the students will be able to -*
CO1: *Design and test combinational and sequential circuit's functionalities*
CO2: *Develop assembly language programs for various applications using 8085 Microprocessors*

Recommended Books:

1. Digital Electronics Theory and Experiments - Virendra Kumar - New age international publishers.
2. Microprocessor 8085 Architecture, Programming and Interfacing - Ajay Wadhwa-PHI

12/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC
Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024 - 25)

Semester V – (DSE –1B)

Course Name: Electronic Instrumentation **Course Code: EL524B**(60 Hours)

HPW: 4 **Credits: 4**

Course Objective: The objective of this course is to -
COB1: *get exposure with various aspects of instruments and their usage.*
COB2: *learn basic concepts of the bridge configurations and their applications.*
COB3: *practice the construction of testing and measuring set up for electronic systems.*
COB4: *have a deep understanding about instrumentation concepts which can be applied to Control systems.*

Unit- I **(15Hrs)**

Introduction: Functional elements of a measurement system – Static characteristics – accuracy, precision, bias, linearity, threshold, resolution, hysteresis, dead space, scale readability, span, static stiffness, input impedance, repeatability and reproducibility - Errors and calculation of errors in overall system – Dynamic characteristics – Zero, first and second order instruments - Responses for step, impulse, ramp and sinusoidal inputs. Classification of standards, IEEE Standards, Elements of ISO 9001, Quality of management Standards.

Unit-II **(15Hrs)**

Transducers and Sensors: Transducer: Transducers, Factors for selection of a transducer, Definition of transducer and sensor – Classification of transducers – Pressure (strain gauge, piezoelectric transducer), displacement (potentiometric, LVDT), Ultra Sonic Transducers (ultrasonic sensors)

Microphones: Microphones and their types, temperature measurement, resistance wire thermometers, semiconductor thermometers and thermocouples, temperature (thermistor) and photosensitive (Vacuum and Gas filled phototubes, photoconductive cell, photovoltaic cell, photo emissive) transducers. Flow Transducers – Flow Meter, Force Transducers –Dynamometer, Acceleration Transducer – accelerometer. Application of Transducers.

Unit- III **(15Hrs)**

Bridge Measurements: Introduction – Wheatstone bridge, Kelvin Bridge and Guarded Wheatstone Bridge. AC Bridges and their applications – Maxwell Bridge, Hay bridge, Schering Bridge and Wien Bridge

17/4/25
CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25
Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Unit- IV **(15Hrs)**

Testing Instruments: Oscilloscopes – Block diagram, CRT vertical and horizontal deflection systems, delay line, multiple trace and Special Oscilloscopes.

Measuring Instruments: DC Voltmeters, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter protection, Extension of range, True RMS responding voltmeters, Specification of instruments.

Course Outcome: Upon successful completion of this course, students will be able to -

CO1*: Employ appropriate instruments to measure given sets of parameters.*

CO2*: Practice the construction of testing and measuring set up for electronic systems*

CO3*: Relate the usage of various instrumentation standards.*

CO4*: Describe the bridge configurations and their applications.*

Recommended Books:

1. Electronic Instrumentation and Measurements by David A. Bell; Oxford University Press
2. Instrumentation Devices and Systems by C S Rangan, G R Sarma, V.S. Mani; McGraw Hill.

Reference Books:

1. Electronic Instrumentation and Measurement Techniques by W. D. Cooper, Prentice Hall India Learning Private Limited.
2. Measurement and Instrumentation Theory and Application by Allen S Morris, Reza Langari, Academic Press

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

20/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Semester V

Course Name: Electronic Instrumentation Lab **Course Code: EL524BP**

HPW: 2 **Credits: 1**

Course Objective: The objective of this course is to -

COB1*: address the underlying concepts and methods behind various measurements.*

COB2*: introduce the fundamentals of Electronic Instruments and measurements, providing an in-depth understanding of measurement errors.*

Handling various testing and measurement instruments

1. Temperature Transducer–(Thermocouple/Thermistor)
2. Pressure Transducer – Strain Gauge
3. DisplacementTransducer–LVDT(LinearVariableDifferentialTransformer)
4. Ultrasonic Transducer (Ultrasonic sensor)
5. Flow Transducer – Flow Meter
6. Force Transducer–Dynamometer
7. Acceleration Transducer–Accelerometer
8. Photovoltaic (Solar cell)
9. Passive Transducer photo cell (LDR)
10. CRO characteristics
11. DC Voltmeter / DC Current meter
12. AC Voltmeter/AC Current meter
13. Adders / Subtractors
14. Multimeter

Course Outcome: Upon successful completion of this course, students will be able to-

CO1*: learn about Bridge Measurements, CRO, Function Generator & Data acquisition systems.*

CO2*: handle various testing and measurement instruments.*

Recommended books:

1. Modern Electronic Instrumentation and Measurement Techniques by D. Helfrick and W.D. Copper, *Prentice-Hall of India, New Delhi.*
2. A Course in Electrical and Electronic Measurement and Instrumentation by K. Sawhney, - *Dhanpat Rai & Sons.*

12/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024 – 25)

Semester V – (GE)

Course Name: Internet of Things (IoT) using Arduino **Course Code: GE524A**(60 Hours)
HPW: 4 **Credits: 4**

Course Objective: The objective of this course is to -
COB1: *Learn the basics of Embedded C programming for Arduino*
COB2: *Understand the working of sensors, actuators and their interfacing*
COB3: *Remotely monitor/acquire various parameters using WiFi modules*
COB4: *Acquire ability to make industrial, engineering and home automation related projects.*

Unit- I **(15Hrs)**
Arduino Simulation Environment
Arduino Uno Architecture, Setup the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino, Interfacing LED, push button and buzzer with Arduino, Interfacing Arduino with LCD

Unit- II **(15Hrs)**
Sensors & Actuators
Overview of Sensors working, Analog and Digital Sensors, Interfacing of Temperature, Humidity, Motion, Light Ultrasonic Sensor, PIR Motion Sensor, Moisture Sensor, and Gas Sensor with Arduino. Interfacing of Actuators -Relay Switch and Servo Motor with Arduino.

Unit- III **(15Hrs)**
Basic Networking with ESP8266 WiFi module
Basics of Wireless Networking, Introduction to ESP8266 Wi-Fi Module, Various Wi-Fi libraries, Web server- introduction, installation, configuration, Posting sensor(s) data to web server. Building applications with ESP 8266- blinking LEDs, automation of appliances, remote monitoring of parameters.

Unit- IV **(15Hrs)**
Internet of Things
Understanding IoT fundamentals, IoT Architecture and protocols, Various Platforms for IoT Real time Examples of IoT, Overview of IoT components and IoT Communication Technologies, Challenges in IoT, Project based on IoT.
Applications: Home automation, Industrial automation, Smart lighting, Smart agriculture

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Course outcomes: On completion of the course, student will be able to -

CO1: *write codes in Arduino IDE*
CO2: *interface sensors and actuators to Arduino devices*
CO3: *apply various protocols for design of IoT systems*
CO4: *understand various applications of IoT and implement as Do It Yourself projects.*

Recommended Books:

1. C programming for Arduino by Jelien Bayle, Packt publishing, Bermingham, UK
2. Sensors and Transducers by D Patranbis, P. H. India, Pvt. Ltd, (2nd edition), 2003
3. NodeMCU ESP8266 communication methods and Protocols – Programming with Arduino IDE by Manoj R Thakur,
4. Building Arduino Projects for the Internet of things by AdeelJaved, APress

Reference Books:

1. Internet of Things (A Hands-on-Approach) by Arshdeep Bahga, Vijay Madisetti, VPI publisher, (1st edition), 2016.
2. The Internet of Things: Enabling Technologies, Platforms, and Use Cases by Pethuru Raj and Anupama C. Raman, CRC Press
3. S. Misra, A. Mukherjee, and A. Roy, 2020. *Introduction to IoT*. Cambridge University Press.
4. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html
5. https://www.arduino.cc

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024 – 25)

Semester V – (GE)

Course Name: Basic Electronics **Course Code: GE524B**(60 Hours)
HPW: 4 **Credits: 4**

Course Objective: The objective of this course is to -
COB1: *develop an understanding of the basic circuit laws and elements of electric circuits*
COB2: *familiarize with the fundamentals of Semiconductor Physics*
COB3: *understand the operation of various semiconductor devices*
COB4: *explore V-I characteristics of Bipolar Junction Transistors in CB, CE and CCconfiguration.*

Unit – I **(15Hrs)**

Units and Definitions: SI units, Electric charge, Electric field, Electric potential, Potential difference, Voltage, EMF.

Resistors: Concept of resistance, V-I relation in resistor, ohm's law and its limitations, types of resistors and their properties and applications, Color Codes, Combination of resistors in series and parallel.

Capacitors: concept of capacitance, V-I relation in capacitor, energy stored in capacitance, types of capacitors & their properties and applications, Color Codes, Combination of capacitors in series and parallel.

Unit-II **(15Hrs)**

Inductors: Concept of inductance, V-I relation in inductor, energy stored in inductors. Mutual inductance and coefficient of coupling, types of inductors and applications, Colour Codes, Combination of inductors in series and parallel.

Simple Circuits: Concepts of impedance and admittance, network definition. Circuit elements, branch, lumped and distributed networks, mesh and node, concepts of voltage and current both ideal and practical.

Periodic waveforms, sine wave – peak, average and RMS values. Kirchoff's Voltage Law (KVL) and Kirchoff's Current Law (KCL).

Unit-III: **(15Hrs)**

The concept of basic semiconductor: P-Material, N-Material, formation of PN junction, Depletion region, Junction capacitance, forward bias, reverse bias, Diode equation (no derivation) and its interpretation, Effect of temperature on reverse saturation current, V-I characteristics and simple applications of i) Junction diode, ii) Zener diode.

Rectifiers: Rectifiers—halfwave, full wave and bridge rectifiers, Efficiency, Ripple factor and regulation (Qualitative).

12/4/25
CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College

25/04/25
Dr. M. PRASAD
Professor
Department of Physics
Osmania University

Unit-IV: **(15Hrs)**

Bipolar Junction Transistor (BJT): PNP and NPN transistors, current components in BJT (I_E, I_B, I_C, Ico), BJT static characteristics (Input and Output), Early effect, CB, CC, CE configurations of transistor and bias conditions (cut off, active and saturation regions).

Course outcomes: *On completion of the course, student will be able to*

CO1: *understand proportional relationship between a signal and a voltage or current that represents the signal.*
CO2: *Understand the circuits using Kirchhoff's laws and Network theorems.*
CO3: *study and analyze the behavior of semiconductor devices.*
CO4: *differentiate the behavior of BJT in CB, CE and CC configurations.*

Recommended Books:

1. Grob's Basic Electronics by Mitchel E Schultz, Tata McGraw Hill.
2. Basic Electronics and Linear Circuits by Bhargava, Kulsreshta, Gupta (TMH).

Reference Books:

1. B Sc I Year Electronics - Telugu Akademi.
2. Principles of Electronics by V.K. Mehta & Rohit Mehta
3. Electronic Devices and Circuits by Allen Mottershed - PHI
4. Electrical Technology Vol. I and II, B L Theraja, A K Theraja - S. Chand
5. Electronic Devices and Circuits by Jacob Millman and Christos C Halkias - TMH.

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024 – 25)

Semester VI – (DSE – 1A)

Course Name: Digital Communication **Course Code: EL624 A**(60 Hours)
HPW: 4 **Credits: 4**

Course Objective: The objective of this course is to -

COB1: *understand the key modules of digital communication systems with emphasis on digital modulation techniques.*

COB2: *get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.*

COB3: *The concept of multiple access techniques and modern communication system*

COB4: *understand the building blocks of Digital Communication System*

Unit-I **(15Hrs)**

Introduction: Need and Necessity of Digitalization, Advantages of Digital communication, Elements of Digital Communication.

Signal analysis: Complex Fourier Spectrum, Fourier transform, Properties of Fourier transform -Random signals and noise, Correlation and Power spectrum.

Information Theory: Introduction, Information Entropy, Properties of Entropy, Information rate, Types of information Sources, Channels, Types of Channels, Joint entropy, Conditional entropy, Redundancy, Mutual in formation, Channel capacity.

Unit-II **(15Hrs)**

Digital Communication Systems: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Amplitude (PPM), Pulse Code Modulation (PCM), Delta modulation, Adaptive delta modulation, Quantization and Noise consideration.

Digital Transmission and Reception: Timing, base band systems, Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase shift Keying (PSK) and Quadrature Amplitude Modulation (QAM).

Unit-III **(15Hrs)**

Error detection and coding: Parity check, CRC, Hamming distance, Hamming codes, cyclic codes, line synchronization codes, Manchester code, NRZ coding, Walsh codes.

Unit-IV **(15Hrs)**

Case studies: cellular concepts, global positioning (GPS), Facsimile, Videotext, WiFi, Bluetooth, IoT and Cognitive radio.

17/4/25
CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri

25/04/25
Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Course outcomes: On completion of the course, student will be able to -

CO1: *understand basic components of Digital System*

CO2: *analyze the error components of digital communication system*

CO3: *understand principles of digital communications and digital techniques required in the rapidly expanding field of digital communication*

CO4: *participate in design and development installation and operation of a wide spectrum applications in the area of digital communications*

Recommended books:

1. Principles of Communication Systems by H. Taub and D. Schilling - Tata McGraw Hill.
2. Communication Electronics: Principles and Applications by L. E. Frenzel - TMH.

Reference books:

1. Digital and Analog Communication Systems by L. W. Couch II - Pearson Education.
2. Analog and Digital Communications by H. P. Hsu - TMH.
3. Communication Systems by S. Haykin - Wiley India.
4. Electronic Communication Systems-Fundamentals through advanced by W. Tomasi – Pearson Education.

12/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

27/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Semester VI – (DSE – 1A)

Course Name: Digital Communication Lab **Course Code: EL624AP**

HPW: 2 **Credits: 1**

Course Objective: The objective of this course is to -

COB1: *understand the fundamental concepts on Pulse modulations, digital modulation techniques, source coding techniques and Error-control coding techniques.*

COB2:*get introduced to the digital communication systems at the practical level*

I Experiments in Internet working:

1. Pulse Amplitude Modulation
2. Pulse Code Modulation
3. Pulse Width Modulation
4. Pulse Phase Modulation
5. Amplitude Shift Keying
6. Frequency Shift Keying
7. Delta modulation
8. Phase shift Keying

II Experiments in Data Communication.

1. Study of serial communication.
2. Study of wireless communications.
3. Study of parallel communication.

Course outcomes: On completion of the course, student will be able to-

CO1:*design and implement different modulation and demodulation techniques*

CO2:*apply time division multiplexing concepts in different pulse modulation techniques*

Recommended books:

1. Electronic Communication Systems by W. Tomasi – *Pearson Education (2004).*

12/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC
Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024-25)

Semester VI – (DSE – 1B)

Course Name: 8051 Microcontroller and Applications **Course Code: EL 624B**(60 Hours)

HPW: 4 **Credits: 4**

Course Objectives: The objective of this course is to -

COB1: *learn what an Embedded System is and to understand the need of microcontrollers in embedded system*

COB2: *understand architecture and features of typical Microcontroller.*

COB3: *familiarize with Assembly Language Programming, Serial communication and Interfacing techniques of 8051 Microcontroller.*

COB4: *master in programming and debugging skills.*

Unit-I **(15Hrs)**

The Microcontroller 8051: Overview and block diagram of 8051. Architecture and pin diagram of 8051. Data types and directives, Memory Organization, register banks and Stack Pointer. PSW Register, other special function registers, I/O port organization. Interrupts and Timer/Counter modules.

Unit-II **(15Hrs)**

Instruction set of 8051 microcontrollers: Classification - Data transfer, Arithmetic, logical, bitwise operations, branching instructions and their usage. Addressing modes, Addressing and accessing memory using various addressing modes.

Programming examples of microcontroller 8051: Simple programs - Addition, Subtraction, multiplication, division, picking the smallest/largest number among a given set of numbers, arranging a given set of numbers in ascending/descending order, Bit manipulation. Subroutines, I/O Programming – flashing LED, generating square wave form. Time delay Calculation.

Unit-III **(15Hrs)**

Timer/Counter Programming in 8051: Programming 8051 timers- basic registers of timers- Timer0, Timer1 registers. TMOD register, TCON register. Timer modes - Mode1, Mode2 programming. Counter mode programming. Program to generate time delay.

Serial communications: Serial communication, types, modes and protocols, Data transfer rates, Serial communication program- SBUF and SCON registers, RS232 standards, Programming timer interrupts.

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Unit-IV **(15Hrs)**

Applications of Microcontroller: DAC - R-2R ladder, Interfacing of DAC 0808 to microcontroller, ADC - successive approximation ADC, Interfacing of ADC 0804 to microcontroller, Interfacing of LCD, Temperature Sensor and Stepper Motor.

Course Outcomes: At the end of this course, students will be able to -

CO1: *Demonstrate a comprehensive understanding of the architecture, organization and functionality of the 8051 microcontroller.*

CO2: *Gain proficiency in programming 8051 for common tasks enabling them to create practical applications*

CO3: *Program timer/counters in different modes and gain a comprehensive understanding of serial communication protocols in 8051 microcontrollers.*

CO4: *Design and implement a variety of practical applications by interfacing 8051 microcontroller with DACs/ADCs, LCD and stepper motor*

Recommended books:

1. The 8051 Microcontrollers and Embedded Systems by Muhammad Ali Mazidi and Janice Gillipsie Mazidi – Pearson Education Asia.
2. The 8051 Microcontroller - architecture, programming and applications by Kennth J. Ayala-Penram International Publishing.

Reference books:

1. Text book of Electronics BSc III year (vol. III)-Telugu Akademi
2. Micro Controllers -Theory and Applications by Ajay V. Deshmukh, TMGH, 1st Edition, 2005.
3. Micro-controller 8051 by D. Karuna Sagar, Narosa Publications.

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Semester VI – (DSE – 1B)

Course Name: 8051 Microcontroller and Applications Lab **Course Code: EL624BP**

HPW: 2 **Credits: 1**

Course Objective: The objective of this course is to -
COB1: *write assembly language programs based on 8051 microcontrollers.*
COB2: *study interfacing of I/O devices with 8051 microcontrollers.*

Experiments using 8051 microcontrollers:

1. Addition, Subtraction, DAA for decimal addition.
2. Multiplication of two numbers using MUL command (later using counter method for repeated addition)
3. Division of two numbers using DIV command (later using counter method for repeated subtraction).
4. Pick out the largest/smallest number among a given set of numbers.
5. Arrange the given numbers in ascending/descending order.
6. Flash a LED connected at a specified-out port terminal with specific time delay using timer/counter.
7. Interface DAC and generate a staircase waveform with a step duration and number of steps as variables.
8. Interface ADC and a temperature sensor to measure temperature.
9. Interface stepper motor to rotate clockwise / anticlockwise through a given angle step.

Experiments with Keil Software:

1. Write a program to pick out the largest/smallest number among a given set of numbers.
2. Write a program to arrange a given set of numbers in ascending/descending order.
3. Write a program to generate a rectangular/square wave form at specified port.
4. Write a program to generate a time delay using timer registers.

Course Outcomes: At the end of this course, students will be able to -
CO1: *Select and use a standard IDE for editing, compiling, debugging and simulation of ALP (program development)*
CO2: *Understand and apply the fundamentals of assembly level programming of microcontrollers to real time problems*

Recommended books:

1. The 8051 Microcontrollers and Embedded Systems by Muhammad Ali Mazidi and Janice Gillipsie Mazidi – Pearson Education Asia.

17/4/25
CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri.

25/04/25
Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007, T. S.

Bharatiya Vidya Bhavan

BHAVAN'S VIVEKANANDA COLLEGE
of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

Syllabus - B Sc III Year Electronics
(w.e.f academic year: 2024-25)

Semester VI – Optional Course

Course Name: Digital System Design with VHDL **Course Code: EL624_O** (60 Hours)
HPW: 4 **Credits: 4**

Course Objective: The students will learn to -

COB1*: write hardware description language (HDL) for the specification, simulation, synthesis and implementation of digital logic systems.*

COB2: *Identify the differences between behavioural and structural coding styles*

COB3: *Write code targeting Xilinx devices specifically and FPGA devices in general.*

COB4: *Apply the information gained to any digital design by using a top-down synthesis design approach.*

Unit-I **(15 Hrs)**

Introduction: Introduction to computer–aided design tools for digital systems. Hardware description languages; introduction to VHDL, data objects, classes and data types, Operators, Overloading, logical operators. Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

Unit-II **(15 Hrs)**

VHDL Statements: Assignment statements, sequential statements and process, conditional statements, case statement, Array and loops, concurrent statements. Types of delays, **Subprograms**: Application of Functions and Procedures, and resolution functions. Structural modelling, component declaration and structural layout.

Unit-III **(15Hrs)**

Packages and Use Clauses: Package Declarations, Package Bodies and Use Clauses.
Combinational Circuit Design: VHDL Models and Simulation of combinational circuits such as multiplexers, demultiplexer, encoders, decoders, code converters, comparators, implementation of Boolean functions.

Unit-IV **(15 Hrs)**

Sequential Circuit Design: VHDL Models and Simulation of Sequential Circuits, Flip-flops – SR, D, JK and T; Shift Registers, Counters – 4-bit ripple, up/down counter and decade counter.

Note: The students should simulate and synthesize digital logic circuits (Combinational & Sequential circuits) using Xilinx ISE 14.5 Design Suit and Xilinx FPGA Board.

Course Outcome: Upon successful completion of this course, students will be able to -

CO1*: learn the syntax and behaviour of VHDL language*

CO2*: use development tools to design digital circuits.*

CO3*: simulate and debug digital systems described in VHDL*

CO4*: synthesize simple digital circuits in CPLD/FPGA*

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College

20/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.

Recommended books:

1. VHDL- Primer by J Bhasker - *PHI*
2. The Designer's Guide to VHDL by Peter J. Ashen den, 2nd Ed, Harcourt India Pvt. Ltd.

Reference books:

1. VHDL by Douglas L. Perry - McGraw Hill.
2. Digital System Design using VHDL by Charles. H. Roth - PWS.
3. VHDL-Analysis & Modelling of Digital Systems by Navabi Z - McGraw Hill.
4. Logic and Computer Design Fundamentals, 2/E by M. Morris Mano - Pearson Education Limited.
5. Digital Electronics Laboratory Experiments Using the Xilinx XC95108 CPLD with Xilinx by by James Stewart, Chao -Ying Wang, Pearson

17/4/25

CHAIRPERSON
BOS in Electronics
Bhavan's Vivekananda College
Sainikpuri,

25/04/25

Dr. M. PRASAD
Professor
Department of Physics
Osmania University
Hyderabad-500 007. T. S.