

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester - V**  
**Paper - V :: Digital Electronics**

**Total number of hours : 45**

**No. of hours per week:3**

**UNIT-I**

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

**UNIT-II**

**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 four variables).

Multiplexer, De-Multiplexer , Decoder(3 to 8) and Encoder( 8 to 3).

**UNIT-III**

**Sequential logic circuits:** Flip-flops - SR, D, JK, T and Master-Slave JK ; **Registers** - Shift Registers-SISO,SIPO, PISO and PIPO Registers, Universal shift register( IC 7496), **Shift register counters-** Ring counter , Johnson Counter.

**UNIT-IV**

**Counters and Semiconductor memories:**

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.

**Semiconductor memories ::** Organization and working of ROM, types of ROM's - PROM, EPROM, EEPROM, FLASH, RAM- static and dynamic.

**Books Recommended:**

1. Digital Principles and Applications – Malvino & Leach - TMH.
2. Digital Principles and Applications-Ronald J.Tocci— Pearson Education.
3. Text book of Electronics Bsc III year (vol.III)-Telugu Akademi
4. Digital Fundamentals – F.Loyd & Jain – Pearson Education.
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
4. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
5. Digital Electronics - Gothman

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester – V Practical**  
**Paper – V :: Digital Electronics**

**No. of hour per week : 3**

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 using gates. Verification of truth table.
4. Construction of Full Adder using gates . verification of truth table.
5. Verification of truth tables of flip flops : RS, D, and JK using IC's.
6. Construction of binary counters 7493

**Simulation experiments:**

1. 4bit 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 74193
5. Multiplexer/DeMultiplexer.
6. Encoder.

**Note: Student has to perform minimum of six experiments**

1. Lab manual for Electronic Devices and Circuits – 4<sup>th</sup> Edition. By David A Bell – PHI
2. Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester - V**  
**Paper - VI :: 8085 Microprocessor and Applications**

**Total number of Hours : 45**

**No. of hours per week:3**

**UNIT-I**

**Introduction to 8085 Microprocessor & its architecture::** Introduction to Microcomputer, Intel 8085 Microprocessor – Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle , Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts – Hardware and Software. Address space partitioning – Memory mapped I/O & I/O mapped I/O .

**UNIT-II**

**Instruction set of 8085 microprocessor :** Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations. Stack and Subroutines, Addressing modes.

**UNIT-III**

**Programming of 8085 microprocessor :** Assembly language programming, addition( 8 and 16 bit ), 8 bit - subtraction, multiplication and division. Finding the largest and smallest number in data array. Program to arrange the given numbers in ascending and descending order . Counters and Time delays.

**UNIT-IV**

**Interfacing of peripherals ::** Types of programmable and non programmable interfacing peripherals- 8212( I/O port) - programmable peripheral interface 8255.

D/A Converters( binary weighted, R-2R ladder network), A/D Converters( Dual slope , Successive approximation), Closed loop and open loop process control systems ( concept only), Stepper motor control.

**Books Recommended :**

- 1) Microprocessor Architecture and Programming – Ramesh S.Goanker – Penram.
- 2) Fundamentals of Microprocessors and Micro controllers – B.Ram, - Dhanpatrai & sons.
- 3) Text book of Electronics B.SC III year (Vol.III)-Telugu Academy.
- 4) Introduction to Microprocessor – Aditya P.Mathur – TMH.
- 5) Microprocessor Lab Premier – K.A. Krishnamurthy.

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester – V Practical**  
**Paper - VI :: 8085 Microprocessor and Applications**

No. of hours per week :3

**I. Microprocessor ( Soft ware ):**

1. Binary addition ( 8 bit and 16 bit )and subtraction ( 8 bit ).
2. Decimal Addition ( DAA).
3. Multiplication and Division ( 8 bit ).
4. Picking of largest/Smallest number from the given data.
5. Arranging the given data in ascending/descending order.
6. Time Delay generation.

**II. Microprocessor ( Hardware ):**

1. R – 2R ladder network ( DAC ) ( 4 bits ) .
2. Interfacing a Stepper motor and rotating it clockwise/anticlockwise direction through a known angle.
3. Interfacing a seven segment display.
4. Interfacing ADC for temperature measurement.

**Note: Student has to perform minimum of six experiments**

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester - VI**  
**Paper - VII :: 8051 Microcontroller and Applications**

**Total number of hours : 45**  
**No. of hours per week:3**

**UNIT-I**

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

**UNIT-II**

**Instruction set of 8051 microcontroller ::** Classification- Data transfer , Arithmetic, logical, Single Bit, Jump, Loop and CALL instructions and their usage. Addressing modes - Immediate, Register, Direct, Indirect, Absolute addressing, Relative addressing, Indexed Addressing and accessing memory using various addressing modes.

**UNIT-III**

**Programming examples of microcontroller 8051:**

Addition, Subtraction, division, picking the smallest/largest number among a given set of numbers, arranging a given a set of numbers in ascending/descending order, Subroutines, I/O Programming, Bit manipulation. Accessing a specified port terminal and generating wave forms.

**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.

**Unit - IV**

**Serial communications:** Serial communication, Types, modes and protocols, Data transfer rates, serial communication program- SBUF and SCON registers, RS232 standards, Programming timer Interrupts,

**Applications of Micro controller:** Displaying information on a LCD, Interfacing a keyboard, Interfacing a temperature sensor, Interfacing of DAC 0808 to microcontroller, Interfacing of ADC 0804 to microcontroller, Seven segment LED.

**Books Recommended :**

- 1) The 8051 Microcontrollers and Embedded Systems – Muhammad Ali Mazidi and Janice Gillispie Mazidi – Pearson Education Asia, 4<sup>th</sup> Reprint, 2002.
- 2) Text book of Electronics Bsc III year (vol.III)-Telugu Akademi.
- 3) Fundamentals of Microprocessors and Microcontrollers – B.Ram.
- 4) The 8051 Microcontroller – architecture, programming and applications Kenneth J.Ayala-Penram International Publishing, 1995.
- 5) Micro controllers-Theory and Applications-Ajay V.Deshmukh.

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**B.Sc. III YEAR , Semester – VI Practical**  
**Paper - VII :: 8051 Microcontroller and applications**

**No. of hours per week:3**

**Experiments using 8051 microcontroller:**

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

**Experiments with Keil Soft ware:**

1. Write a program to pick out largest/smallest number among a given set of number.
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.

**Note: Student has to perform minimum of six experiments**

**B.Sc. ELECTRONICS SYLLABUS**  
**B.Sc. III YEAR , Semester - VI**  
**Paper - VIII :: Digital System Design Using VHDL**

**Total number of hours : 45**  
**No. of hours per week:3**

**UNIT – I**

**Fundamental Concepts:** Modeling Digital Systems, Domains and Levels of Modeling, Modeling Languages, VHDL Modeling Concepts, Learning a New Language: Lexical Elements and Syntax.

**Scalar Data Types and Operations:** Constants and Variables, Scalar Types, Type Classification, Attributes of Scalar Types, Expressions and Operators.

**Sequential Statements:** If Statements, Case Statements, Null Statements, Loop Statements, Assertion and Report Statements.

**UNIT – II**

Composite Data Types and Operations: Arrays, Unconstrained Array Types, Array Operations and Referencing, Records.

**Basic Modeling Constructs:** Entity Declarations, Architecture Bodies, Behavioral Descriptions, Structural Descriptions, Design Processing.

**Subprograms:** Procedures, Procedure Parameters, Concurrent Procedure Call Statements, Functions, Overloading, Visibility of Declarations.

**UNIT – III**

**Packages and Use Clauses:** Package Declarations, Package Bodies, Use Clauses, The Predefined Package Standard.

**Resolved Signals:** Basic Resolved Signals, IEEE Std\_Logic\_1164 Resolved Subtypes, Resolved Signals and Ports, Resolved Signal Parameters.

**UNIT – IV**

**Generic Constants:** Parameterizing Behavior, Parameterizing Structure.

**Case Study : A Pipelined Multiplier Accumulator:** Algorithm Outline, A Behavioral Model, A Register-Transfer-Level Model.

**Recommended Books :**

1. The Designer's Guide to VHDL -By Peter J.Ashenden, 2<sup>nd</sup> Ed., 1<sup>st</sup> Indian Reprint, Harcourt India Pvt. Ltd., 2001.
2. VHDL Programming by Example – By Douglas L.Perry., 4<sup>th</sup> Ed., TMH., 2002
3. Introductory VHDL : From Simulation to Synthesis –By Sudhakar Yalamanchili., Pearson Education Asia., 2001
4. A VHDL Primer - By J.Bhasker ., Pearson Education Asia, 11<sup>th</sup> Indian Reprint, 2004
5. Fundamentals of Digital Logic with VHDL Design - By Stephen Brown & Zvonko Vranesic., TMH. 2002
6. Digital Systems Design using VHDL by Charles H.Roth Jr., PWS Pub.,1998
7. VHDL – Analysis & Modeling of Digital Systems – By Zainalabedin Navabi., 2<sup>nd</sup> Ed., MH., 1998

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**B.Sc. III YEAR , Semester – VI Practical**  
**Paper - VIII :: Digital System Design Using VHDL**

Number of hour per week :3

**VHDL – Program entry, simulation and Implementation ( CPLD/FPGA ) using appropriate HDL Software for the following circuits.**

1. All types of logic gates ( Data flow ).
2. Half Adder ( Data Flow, Structural and Schematic ).
3. Full Adder ( Data Flow, structural and Schematic ).
4. Half Subtractor ( Data Flow, Structural and Schematic ).
5. Full Subtractor ( Data Flow, Structural and Schematic).
6. Two control input Mux. Using case.
7. Two control input Mux. Using conditional signal assignment.
8. Two control input Mux. Using selected signal assignment.
9. Two control input Demux. Using case.
10. BCD to seven segment decoder.
11. Modeling a RSFF with assertion, report and different levels of severity ( Behavioural).
12. Modeling a BCD counter ( Top level behavioural )
13. Writing a test bench for a Half adder.
14. Writing a test bench for a Full adder.

**Note: Student has to perform minimum of six experiments**

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