

**B.Sc. (Electronics) - III Year**  
**Semester – VI**  
**Paper – VI: (A) Microcontroller & Applications**  
**(DSE-2: Compulsory)**

**Total: 56 Hrs**  
**(4 Hrs / week)**

**UNIT-I (14 Hrs)**

**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 (14 Hrs)**

**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 (14 Hrs)**

**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: Timer 0, Timer 1 registers, TMOD register, TCON register, Timer modes – Mode 1, Mode 2 programming, Counter mode programming, Program to generate time delay.

**Unit – IV (14 Hrs)**

**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.

**Suggested Books:**

- 1) The 8051 Microcontrollers and Embedded Systems – Muhammad Ali Mazidi and Janice Gillispie Mazidi – Pearson Education Asia, 4th 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.
- 6) Micro-controller 8051, D. Karuna Sagar, Narosa B

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**Paper – VI: (A) Microcontroller & Applications Practical's**  
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**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 Software:**

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) - III Year**  
**Semester – VI**  
**Paper – VI: (B) Digital communication**  
**(DSE-2: Compulsory)**

**Total: 56 Hrs**  
**(4 Hrs / week)**

**Unit -I: (14 Hrs)**

**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 signal and noise, Correlation and Power spectrum.

**Information Theory:** Introduction, Information Entropy, Properties of Entropy, Information rate, Types of information sources, Channels, joint Entropy. Conditional entropy, Redundancy, mutual information, channel capacity.

**Unit- II: (14 Hrs)**

**Digital Communication System:** Pulse Modulation: PAM, PWM, PPM, PCM, delta modulation, adaptive delta modulation, quantization and noise consideration. Digital Transmission and Reception: Timing, base band systems, ASK, FSK, PSK, QAM.

**Unit - III: (14 Hrs)**

**Error detection and coding:** Introduction,, parity check, cyclic redundancy check (CRC), Hamming distance, Hamming codes, Cyclic codes, line synchronization codes, Manchester code, Non-Return to Zero (NRZ) coding, Walsh codes

**Unit - IV: (14 Hrs)**

**Case Studies:** Cellular concepts, global position system (GPS), Facsimile, Video text, Wifi, Bluetooth, IOT, cognitive radio.

**Suggested Books:**

1. Analog and Digital Communications- Simon Haykin, John Wiley,2005
2. Electronic Communication Systems-Fundamentals through Advanced- Wayne Tomasi, 5<sup>th</sup> Edition, PHI, 2009.
3. Principles of Communication Systems- Herbart Taub, Donald L Schilinh, Goutam Saha,3<sup>rd</sup> Edition, Mcgraw-Hill,2008.
4. Electronics Communications- Dennis Roddy and John Coolean, 4<sup>th</sup> edition, PEA,2004
5. Electronics &Communication Systems- George Kennedy and Benard Davis, TMH 2004
6. Analog and Digital Communication- K Sam Shanmugam, Willey, 2005
7. Digital Communications, P. Ramakrishna Rao, TataMcGraw hills publishing Company Limited, New Delhi.2011.
8. Analog and Digital Communication systems- M.S. Roden, 3<sup>rd</sup> Edition, Prentice Hall of India.
10. Modern Digital and Analog Communication Systems - B.P. Lathi.
12. Telecommunication – T.H. Brewster, McGraw Hill.
13. Principles of Digital communication, Das, Chatterjee and Mallick, Wiley Eastern Ltd.

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**Semester – VI**  
**Paper – VI: (B) Digital communication Practical's**  
**(DSE-2: Compulsory)**

**I. Study of**

1. Pulse Amplitude modulation
2. Pulse code modulation
3. pulse width modulation
4. PulsePhase modulation
5. Amplitude Shift Key
6. Frequency shift key
7. Delta Modulation
8. Pulse shift keying

**II. Experiments in Data Communication.**

- 1) Study of serial communication.
- 2) Study of protocol in communications.
- 3) Study of Fiber optic communications.
- 4) Study of wireless communications.
- 5) Study of parallel communication.

**Note: Minimum of 8 experiments to be performed.**