Shiksha Mandal's
Bajaj College of Science, Wardha
(An Autonomous Institution Affiliated to RTM Nagpur University, Nagpur)

SYLLABUS FOR B.Sc. (ELECTRONICS) PART III
(Approved in BoS Meeting held on 11.03.2025 to be implemented from the academic Session 2025-26)
B.Sc. PART III - SEMESTER V

Course Name: DSC-V Electronic Communication
Course code: UEL350T

Credits: 4   **No. of Hrs.: 60**

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of the course student will be able to:
1	Fundamentals of electronic communication and various modulation and demodulation techniques of communication.	Use of different modulation and demodulation techniques used in analog communication and identify and solve basic communication problems.
2	The concept and theory of propagation of signals and the various characteristics of different types of antennas.	Understand about various types of propagation signals. Analyze the radiation mechanisms of antennas and demonstrate knowledge of antennas in communication systems.
3	The Concepts of digital communication and various techniques used in digital communication	Understand the process of digital communication and to implement it.
4	The basic elements of digital, optical fiber system, FAX and cellular communication.	Understand the concept and operation of digital, optical fiber system, FAX and cellular communication

Unit-I: Introduction to Electronic communication, block diagram of communication system, Types of communication: analog, digital, simplex, duplex; baseband, modulated, concept of modulation, need for modulation, types of modulation (AM, FM, PM), AM Modulation, modulation index, mathematical equation, Power in AM. Application.

Unit-II: AM receivers Block diagram of Tuned Radio Frequency receiver and its working, Block diagram of AM super heterodyne receiver and its working, Characteristics of AM radio receiver- Sensitivity, selectivity, fidelity definitions, Image frequency and its rejection, Demodulation of AM signal, Diode detector, Need of AGC & its types – simple, delayed

Unit-III: Frequency Modulation, mathematical representation of FM & its meaning, direct FM Generation using FET, Concept of Pre-emphasis & De-emphasis FM receiver: Block diagram and explanation of FM Super heterodyne radio receiver, Balanced slope detector.

Unit-IV: Digital communication: Introduction, synchronous, asynchronous transmission, Shannon theorem, ASK, FSK, and PSK modulation.

Unit-V: Propagation modes of signals: ground waves, sky waves, Ionosphere and satellite; antenna fundamentals, basic principles and types.

Unit-VI: Fiber optic communication system, Advantages of FOC, concept of Fax, concept of cellular telephone, block diagram of cellular telephone, advantages

B.Sc. PART III - SEMESTER V
Course Name: DSC-V Electronic Communication Practical
Course code: UEL350P
Credits: 2 (4Prs.)   **No. of Hrs.: 60**

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

List of Practical:

Section A:

1. Study of AM Transmitter
2. Study of AM Receiver
3. Study of FM Modulation
4. Study of FM Demodulation
5. Study of FM Receiver
6. Study of narrow band amplifier using op-amp/ Transistor
7. Wire impedance measurement

Section B:

1. ASK using op-Amp
2. FSK using op-Amp
3. Study of BPSK Modulator
4. Study of BPSK Demodulator
5. Study of DPSK Modulator
6. Study of DPSK Demodulator
7. IR Link study
8. Study of Optical fiber communication

Text Books:

1) Kennedy G.: Electronic communication system (Mc-Graw Hill)
2) Dennis Roddy & John Coolen: Electronic communication (PHI)
3) Communication Electronics, Principles and Application, Frenzel (Mc-Graw Hill)

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available athttp://ocw. mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-   002Spring-2007/VideoLectures/index.htm

2. www.electronics-tutorials.com
3. http://electronics.howstuffworks .com
4. www.science-ebooks.com/electronics
5. http://computer.howstu! works.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER V
Course Name: DSC-VI Fundamentals of Microprocessor 8085
Course code: UEL355T

Credits: 4   **No. of Hrs.: 60**

Course Objective and Course Outcome

SN	Learning Objectives Students will try to learn:	Course Learning Outcomes After successful completion of the course student will be able to:
1	To develop background and basic knowledge of 8085microprocessor.	Draw and describe architecture of 8085 microprocessor.
2	To learn the importance of T state and corresponding machine cycle.	Understands the instruction cycle.
3	To learn the basic instructions of 8085	Understand the concept of microprocessor programming.
4	To learn the concept of stack and subroutine.	Write the subroutine for different tasks.
5	To know the concept of interfacing	Understand the different method og interfacing.
6	To know the different interfacing methods, DMA and basic knowledge of 8255PPI and its interfacing to 8085 microprocessors.	Understand various interfacing schemes, DMA. Draw and describe architecture of 8255 PPI and its interfacing to 8085 microprocessors.

Unit I: Block diagram of Intel 8085, ALU, Timing and control unit, General purpose registers, Accumulator, PC, SP, IR, ID, Interrupt, Address and Data bus multiplexing

Unit II: Flags. Instruction Cycle: T-states, Fetch operation, Execute operation, Machine cycle.

Unit III: Addressing modes, instruction Set: Data transfer group, Arithmetic group, Logic group, Branch control group

Unit IV: I/O and machine control group, stack and subroutines, simple programs based on above instructions.

Unit V: Need for interfacing, modes of data transfer, synchronous and asynchronous, interrupt driven, DMA,

Unit VI: PPI 8255- Block diagram, modes of operation, control word formats.

B.Sc. PART III - SEMESTER V
Course Name: DSC-VI Fundamentals of Microprocessor 8085 Practical
Course code: UEL355P
Credits: 2 (4Prs.)   **No. of Hrs.: 60**

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

Section A

1. Program for data transfer instruction,

2. Program for addition of 8-bit numbers (Hex and decimal),

3. Program for addition of 16-bit numbers (Hex and decimal),

4. Program for 8-bit subtraction,

5. Program for 8-bit multiplication,

6. Program for 1's and 2's complement of 8 bit numbers,

7. Program for masking of 4 MSB and LSB of a 8-bit numbers,

10. Program for arranging a series of numbers in ascending order,

11. Program for arranging a series of numbers in descending order,

Section B

1. Program to call a function in main program.
2. Program to understand the concept and use of stacks.
3. Program of subroutine for multiplication two numbers and its use.
4. Program to interface digital input using 8255 as input port.
5. Program to interface LED display as output port using 8255.
6. Programs on different modes of operations with 8255.
7. Program to display LED with delay using 8255.
8. Program to display digits in seven segment display using 8255.Programs on subroutines.
9. Programs to interface 8255.

REFERENCE BOOKS

1. Fundamentals of Microprocessor and Microcomputers, B.Ram, Dhanpat Rai publications
2. Microprocessor Architecture, programming and applications with 8085/8080A Ramesh S. Gaonkar, Wiley eastern ltd.

3. Introduction to Microprocessor, A. P. Mathur, Tata McGraw Hill,
4. Microprocessor and Interfacing, D. V. Hall, Tata McGraw Hill,
5. Introduction to Microprocessors, Vilas Ghodki and Satish Sharma

Web Resources

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

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2. http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm
3. www.electronics-tutorials.com
4. www.science-ebooks.com/electronics
5. http://computer.howstu! works.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html etc

B.Sc. PART III - SEMESTER V

(Elective)

Course Name: DSE I Data Structures

Course code: UEL354T

Credits: 4 **No. of Hrs.: 60**

Course Objective and Course Outcome Framework

SN	Course Objectives Students will try to learn:	Course Outcomes After successful completion of the course student will be able to:
1.	To understand the Lists, arrays and stacks.	Understand the fundamental of stacks, lists.
2.	To learn the recursion and its utility.	Use of recursion in different cases.
3.	To understand concept of queue and linked list.	Write algorithms based on queue and linked lists.
4.	To develop the logic for tree.	Understand the use of Tree.
5.	To understand the importance of sorting.	Write C programs for sorting using different techniques.
6.	To know the importance searching.	Understand the concept of searching.

Unit-I: Introduction: Lists: General Algorithm and operation on data structure. e.g. ADD, DELETE, MERGE, SORT, SEARCH. Arrays& Stacks: Definition and examples of arrays and stacks in C. Implementation infix, postfix & Prefix using stacks and arrays.

Unit-II: Recursion: Definition of recursion and processes, examples of recursion Translation from prefix to postfix simulation recursion.

Unit-III: Queues & linked list Definition of Queue and its representation as linked: single & double lists. Circular linked list, stack as a circular lists.

Unit-IV: Trees: Definition of trees & its family definition & representation in a diagrammatic mode. Binary representation of tree as a linked lists.

Unit-V: Sorting: Sequential sort, Binary sort, merge sort, selection sorts, Insertion sort and merging technique.

Unit VI: Searching: Binary Search, Sequentially searching, hashing, indexed search techniques.

REFERENCE BOOKS

1. Fundamentals of Microprocessor and Microcomputers, B. Ram, Dhanpat Rai publications
2. Classical Data Structures: D. Samantha. PHI, New Delhi.
3. Data Structure: LIPSCHUTZ SCHAUM OUTLINE SERIES
4. Data Structures Using C++: Y. Kanetkar
5. Data Structures Using C++: Tanenbaum
6. Data Structure (Algorithms & Programs) - Dr. Vishal M. Lichade, Sigma Solution Publication
7. Data Structures by Tremblay Sorenson

B.Sc. PART III - SEMESTER V

(Elective)

Course Name: DSE I Biomedical Instrumentation

Course code: UEL354T

Credits: 4   **No. of Hrs.: 60**

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation
1	To develop background knowledge of Biomedical Instrumentation	Describe usefulness of architecture of 8051 microcontroller.
2	To write assembly language programs of 8051 microcontroller for various applications.	Write assembly language program for 8051 microcontroller.
3	To know the importance of different peripheral devices and their interfacing to 8051 microcontrollers.	Interface various peripheral devices to the 8051 microcontroller.

4	The elements of serial communication using 8051 microcontroller.	Understand the concept and protocols for serial communication using 8051 microcontroller.

Unit I: Fundamentals of Biomedical Instrumentation: Sources of biomedical signals, Basic medical instrumentation system, Performance requirements of Medical Instrumentation System, Intelligent Medical Instrumentation System, biometrics.

Unit II: Bioelectric Signals and Electrodes: Origin of Bioelectric signals, Recording Electrodes, Silver-Silver Chloride Electrodes, Electrodes for ECG, EEG and EMG.

Unit III: Biomedical Recorders: Electrocardiograph (ECG), vector cardiograph (VCG), Phonocardiograph (PCG), Electroencephalograph (EEG), Electromyograph (EMG), cardiac pacemakers.

Unit IV: Magnetic Resonance Imaging System: Principles of NMR Imaging System, Image Reconstruction Techniques, Basic NMR Components, Biological Effect of NMR Imaging, Advantages of NMR, Imaging System, principle of MRI.

Unit V: Radio-therapy Equipment: Use of high voltage X-ray Machines, Development of Betatron, Cobolt-60 Machine, Medical Linear Accelerator Machine, X-ray tomography, short wave, micro-wave and surgical diathermy

Unit VI: Biomedical Telemetry and Telemedicine: Wireless Telemetry, Single Channel Telemetry Systems, Multi-channel Wireless Telemetry Systems, Multi-patient Telemetry, Implantable Telemetry Systems, Transmission of Analog Physiological Signals Over Telephone, Telemedicine.

Text Books:

1) R. S. Khandpur: Biomedical Instrumentation
2) Cromwell, Leslie: Biomedical instrumentation and measurements

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available athttp://ocw. mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6- 002Spring-2007/VideoLectures/index.htm

2. www.electronics-tutorials.com

3. http://electronics.howstuffworks .com

4. www.science-ebooks.com/electronics

5. http://computer.howstu! works.com

6. www.geocities.com/CapeCanaveral/1221/elec1.htm

7. http://101 science.com/eleclinks.htm

8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html

9. www.discovercircuits.com/resources/tutorials.html

10. www.electronics-lab.com/

11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER V

Vocational Skill Course (VSC)

Course Name: **Consumer Product Design using Timer IC**

Course code: **UEL352P**

Credits: 2 (4 Pr)   **No. of Hrs.: 60**

Course description:

This course covers the design of various consumer products based on IC555. This would help the student to understand the fundamentals of need based electronic circuit design for consumers. This course may lead to develop skills of circuit design and employability. This course may also be helpful for start-ups in the field of electronics as an entrepreneur.

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation students shall be able to:
1	Timer IC application	Describe the use of timer IC
2	Various consumer product design using IC555	Design the consumer products using IC
3	To use IC for user-based products	Develop and assemble user-based products using electronic components

Unit I: Construction, Principle of operation and working: Adjustable Delay On-Off Timer Circuit, Automatic Water Level Controller Circuit, Electronic Dog Whistle, Smoke Sensor System

Unit II: Construction, Principle of operation and working: Study and repair of hearing aid, Dome Lamp Dimmer, Light Sensor and Darkness Detector Circuit, Periodically On-Off Mosquito Repellent, Touch On-Off Sensor Switch Circuit

Unit III: Construction, Principle of operation and working: Water Pump Controller, Water Overflow Alarm, Auto Reset Proximity Detector, Wire Loop Breaking Alarm Signal for burglars, Hidden Active Cell Phone Detector

List of Practical:

1. Adjustable Delay On-Off Timer Circuit
2. Automatic Water Level Controller Circuit

3. Electronic Dog Whistle
4. Smoke Sensor System
5. Study and repair of hearing aid
6. Dome Lamp Dimmer
7. Light Sensor and Darkness Detector Circuit
8. Periodically On-Off Mosquito Repellent
9. Touch On-Off Sensor Switch Circuit
10. Water Pump Controller
11. Water Overflow Alarm
12. Auto Reset Proximity Detector
13. Wire Loop Breaking Alarm Signal for burglars
14. Hidden Active Cell Phone Detector

Reference Books:

1. Ramakant Gaikwad, Op-Amps and Linear Integrated Circuits
2. R.M. Marston, Timer-Generator Circuits Manual
3. D. Roy Choudhary, Linear Integrated Circuits

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SYLLABUS FOR B.Sc. (ELECTRONICS) PART III
(Approved in BoS Meeting held on 11.03.2025 to be implemented from the academic Session 2025-26)
B.Sc. PART III - SEMESTER VI

Course Name: DSC-VII Programming in 'C'
Course code: UEL360T

Credits: 4   **No. of Hrs.: 60**

Learning Objective and Course Learning Outcome

SN	Learning Objectives	Course Learning Outcomes
	Students will try to learn:	*After successful completion of the course student will be able to:*
1.	To understand the different types of programming languages and in particular the basics of 'C'.	Understand the fundamental of 'C' language.
2.	To learn the different types of operators	Use of operators in C language in 'C' programs.
3.	To undertake small 'C' language projects.	Write algorithms, draw " ow charts and 'C' programs for simple applications.
4.	To develop the logic for control structures	Understand the use of Transfer control statements.
5.	To understand the importance of functions, structures and union.	Write C programs using functions.
6.	To know the importance file handling.	Understand the concept of files.

Unit I: Constant, Variables and Operators: Character set, C tokens, constant, Keyword, identifiers, variables, data types, declaration of variables,

Unit II: Arithmetic, relational logical, assignment, increment, conditional, bitwise, operators, Arithmetic expression, evaluation of expression, precedence of operators, input/output functions.

Unit III: Control Structures & Arrays: if- statements, if-else statement, switch statement, go-to statement, while statement,

Unit IV: do-while statement, for statement, one dimensional array.

Unit V: User Defined Functions, Types of functions, return values and their types, scope and lifetime of variables in function; basic concept of structure and unions, difference between structure and union.

Unit VI: Pointers: Basic concept, expression, variables Deleting and opening file, closing a file, I/O operations on file, command line arguments, port interfacing.

REFERENCE BOOKS

1. Let us C , Yashwant Kanetkar
2. Gate to C programming, Kishor S. B., Vilas Ghodki and Madhavi
3. C in depth, Shrivastava, BPB publication
4. Programming in ANSI C, E Balgurusamy, Tata McGraw Hill
5. Programming with C Byron Gottfried Schaums outline series, TMH.

Web Resources
Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available athttp://ocw. mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm
2. www.electronics-tutorials.com
3. www.science-ebooks.com/electronics
4. http://computer.howstu! works.com
5. www.geocities.com/CapeCanaveral/1221/elec1.htm
6. http://101 science.com/eleclinks.htm
7. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
8. www.discovercircuits.com/resources/tutorials.html
9. www.electronics-lab.com/

B.Sc. PART III - SEMESTER VI

Course Name: DSC-VII Programming in 'C' Practical
Course code: UEL360P
Credits: 2 (4Prs.)   **No. of Hrs.: 60**

Students are expected to perform at least 5 programs from section A and 5 programs from section B**.**

Section A

1. 1.Write an algorithm, draw flowchart and execute a program to find the greatest of three numbers.
2. Write an algorithm, draw flowchart and execute a program to swap values of two numbers without using third variable.
3. Write an algorithm, draw flowchart and execute a program to calculate the factorial of given number.
4. Write an algorithm, draw flowchart and execute a program to check given number is prime or not.
5. Write an algorithm, draw flowchart and execute a program to print Fibonacci series up to 10 terms.
6. Write an algorithm, draw flowchart and execute a program to check entered number is palindrome or not.

7. Write an algorithm, draw flowchart and execute a program to check enter character is vowel or not.
8. Write an algorithm, draw flowchart and execute a program to find the sum of digit of entered.
9. Write an algorithm, draw flowchart and execute a program to find the reverse of entered.

Section B

1. Programs to find the average of n numbers stored in an array.
2. Program to find greatest of n numbers stored in an array.
3. Program to find smallest of n numbers stored in an array.
4. Program to sort an array of n elements in ascending order using selection sort.
5. Program to sort an array of n elements in descending order using selection sort.
6. Program to sort an array of n elements in ascending order using bubble sort.
7. Program to sort an array of n elements in descending order using bubble sort.
8. Program over structures.
9. Program over unions.
10. Program to write a function great() to find greatest of an array and use this function in main().
11. Programs for writing different functions and its use in main().
12. Programs over file handling.

B.Sc. PART III - SEMESTER VI

Course Name: DSC-VIII The 8051 Microcontroller
Course code: UEL365T

Credits: 4   **No. of Hrs.: 60**

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of the course student will be able to:
1	To develop background knowledge and core expertise of 8051 microcontroller.	Draw and describe architecture of 8051 microcontroller.
2	To write assembly language programs of 8051 microcontroller for various applications.	Write assembly language program for 8051 microcontroller.
3	To know the importance of different peripheral devices and their interfacing to 8051 microcontrollers.	Interface various peripheral devices to the 8051 microcontroller.
4	The elements of serial communication using 8051 microcontroller.	Understand the concept and protocols for serial communication using 8051 microcontroller.

Unit I: Introduction: Microprocessor and Microcontroller, their comparison, Architecture and features of 8051, Internal and External memory, Flags, SFR Map, SFR Function, Accumulator, Register B, Port registers (P0, P1, P2 and P3), Power Management (PCON).

Unit II: Counters and Timers: Timer counter interrupts, Timing, Timer modes of operation: Mode 0, 1, 2 and 3, Counting, Serial data interrupts, data transmission, Data Reception, serial data transmission modes, External interrupts, Interrupt control, priority, interrupt destinations.

Unit III: Addressing modes, external data moves, MOV, MOVC and MOVX instructions, Stack, PUSH and POP instructions, Data Exchanges, Logical instructions of 8051.

Unit IV: Arithmetic instructions: Addition, subtraction, multiplication, division, increment and decrement. Branching instructions: SJMP, AJMP, LJMP, conditional branching instructions. CALL and Subroutine, Return instructions.

Unit V: Interfacing with 8051microcontroller: Keyboard (simple and matrix), key bouncing and debouncing, display - LCD (16 x 2), ADC and DAC, LED Matrix and Serial communication with personal computer

Unit VI: Programming 8051: Assembly language programs for 8051: Data Transfer, block transfer, addition and subtraction (8-bit and 16-bit), 8-bit multiplication and division, generation of delay using registers, timers, LED Blink, square wave generation, staircase generation, frequency generation using timer.

B.Sc. PART III - SEMESTER VI

Course Name: DSC-VIII The 8051 Microcontroller Practical
Course code: UEL365P

Credits: 2   **No. of Hrs.: 60**

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

List of Practical:

Assembly language programs for 8051 microcontroller

Section A:

1. Data Transfer
2. Block transfer
3. 8-bit Addition
4. 16-bit Addition
5. 8-bit subtraction
6. 16-bit subtraction
7. 8-bit multiplication
8. 8-bit division
9. Generation of delay using registers,
10. Generation of delay using registers timer

Section B:

1. LED Blink
2. Relay interface
3. Stepper Motor Interface
4. 16x2 Interface 5. Study of bit operation on port (A, B, C, D)
5. LED Blink using timer
6. Frequency Generator using timer

7. External frequency counting timer
8. Interrupt driven operation
9. Single blink on key I/P
10. Opto- triac interface
11. ADC 0808 interface
12. DAC 0808 interface
13. IIC interface using R.T.C.

Text Books:
1) Kenneth J. Ayala: The 8051 microcontroller
2) Mazidi and Mazidi: The 8051 microcontroller
3) Mike Predko: The 8051 microcontroller
4) Rajkamal: Microcontrollers

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

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3. http://electronics.howstuffworks .com
4. www.science-ebooks.com/electronics
5. http://computer.howstu! works.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER VI

(Elective)

Course Name: DSE-II The 8086 Microprocessor and IoT
Course code: UEL364T

Credits: 4   No. of Hrs.: 60

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation students shall be able to:
1	8086 microprocessor and its architecture	Describe 8086 microprocessor and its architecture
2	Instructions of 8086 microprocessor	Understand the instruction processing and assembly language programs using 8086 microprocessor instruction set

3	Interfacing techniques of 8086 microprocessor	Understand Interfacing of memory & various I/O devices with 8086 microprocessor
4	Basics of Internet of Things	the basic concepts of Internet of Things

Unit I: 8086 Architecture: 8086 architecture and pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation.

Unit II: 8086 Instruction Set: 8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming: Integer instructions and computations: Data transfer instructions, Arithmetic instructions and their use in 8086 programming.

Unit III: 8086 Instruction Set: 8086 programming: logical instructions. Shift and rotate instructions and their use in 8086 programming. 8086 flag register and Flag control instructions, compare instruction, control flow and jump instructions, Loops & loop handling instructions. 8086 programming using these instructions.

Unit IV: Subroutines& Macros: The 8086-stack segment and stack related instructions. 8086 I/O Address space. Subroutines and related instructions, Parameter passing, Concept of Macros, Status saving on stack. Concept of recursion at assembly program level.8086 Programming using subroutines, recursion and macros.

Unit V: 8086 Interrupt: 8086 Interrupts types, priority and instructions. Interrupt vector table, External hardware-interrupt interface signals & interrupts sequence. Software interrupts. Non-maskable interrupts. 8086 microprocessor interrupt programming.

Unit VI: Internet of Things (IoT): Internet of things: An overview, IoT conceptual framework, IoT Architectural View, Technology behind IoT, Sources of IoT, M2M communication, Examples of IoT.

Text Books:

1. A. K. Ray & K. M. Bhurchandi: Advanced Microprocessors & Peripherals, Third Edition (TMH).
2. Raj Kamal: Internet of Things, Architecture and Design Principals, McGraw Hill Education (India) Private Limited

Reference Books:

1. W. A. Triebel & Avatar Singh: The 8088/8086 Microprocessors (4e) (PHI /Pearson Education)
2. Liu & Gibson: The 8088/8086 Microprocessor Architecture Programming and Interface (6/e) (PHI)

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available athttp://ocw. mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6- 002Spring-2007/VideoLectures/index.htm
2. www.electronics-tutorials.com
3. http://electronics.howstuffworks .com
4. www.science-ebooks.com/electronics
5. http://computer.howstu! works.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm
8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html
9. www.discovercircuits.com/resources/tutorials.html
10. www.electronics-lab.com/
11. www.glolab.com/links/links.html

B.Sc. PART III - SEMESTER VI

(Elective)

Course Name: DSE-II Mechatronics
Course code: UEL364T

Credits: 4   No. of Hrs.: 60

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation students shall be able to:
1	Fundamentals of Mechatronics	Describe 8086 microprocessor and its architecture
2	Electrical actuation Systems and Controllers	Understand the instruction processing and assembly language programs using 8086 microprocessor instruction set
3	Programmable controllers and communication systems	Understand Interfacing of memory & various I/O devices with 8086 microprocessor
4	Basics fault finding of systems	the basic concepts of Internet of Things

Unit I: Mechatronics: What is mechatronics, design process, systems, measurement systems, control systems, Programmable logic controller.

Unit II: Electrical actuation systems: Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C. motors, A.C. motors, Stepper motors

Unit III: Closed loop Controllers: continuous and discrete control processes, Terminology, Two step mode, Proportional mode, Derivative control, Integral control, PID controller, Digital controllers, Controller tuning, velocity control, Adaptive control.

Unit IV: Programmable Logic Controller: Programmable logic controller, basic PLC structure, I/P- O/ P Processing, Ladder programming, Instruction lists, latching and integral relays, sequencing, timers and Counters, Shift registers, Master and jump controls, data handling.

Unit V: Communication Systems: Digital communications, Centralised, Hierarchical and Distributed control, Networks, Protocols, open systems Interconnection communication model, Serial Communication interfaces, Parallel Communication Interfaces, Wireless protocols

Unit VI: Fault Finding: Fault - detection Techniques, Watchdog timer, Parity and error coding checks, Common hardware faults, Microprocessor Systems, Emulation and simulation, PLC systems

Text Book:

W. Bolton (4th edition): Mechatronics

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available athttp://ocw. mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6- 002Spring- 2007/VideoLectures/index.htm

2. www.electronics-tutorials.com

3. http://electronics.howstuffworks .com

4. www.science-ebooks.com/electronics

5. http://computer.howstu! works.com

6. www.geocities.com/CapeCanaveral/1221/elec1.htm

7. http://101 science.com/eleclinks.htm

8. www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electroniclinks.html

9. www.discovercircuits.com/resources/tutorials.html

10. www.electronics-lab.com/

11. www.glolab.com/links/links.html

Credits: 2 (4 Pr)	No. of Hrs.: 60

Course description:

This course covers the fundamental of microphone and speakers widely used in infotainment systems. The course also covers their principal and working and characteristics. The course will also provide a comprehensive understanding of microphone and speakers. It also includes the possible repairs and assembling of these useful components.

Course Objective and Course Outcome

SN	Course Objectives	Course Outcome
	Students will learn:	After successful completion of Biomedical Instrumentation students shall be able to:
1	Wave fundamentals, pitch and transducers associated with sound	Describe the use of various transducers
2	Various types of microphones and headsets	Understand the need-based use of microphones and headsets
3	Different speakers and their area of usefulness	Understand the speaker and area of use
4	Fundamentals of PA system	Use PA system properly

Unit I: Sound waves, Types, Classification and quality – pitch, low and high frequency, Input transducers: Microphones – types of microphones, sensitivities of microphones, Output transducers: Loudspeaker, Mono, Stereo, panning, surround and filters, Perception of sound, wave length, Amplitude, Frequency, pitch, harmonics, equalization, reverberation time, basic set-up of recording system, analog, digital, cables and connectors.

Unit II: Microphone: Characteristics of Microphones, Carbon Microphones, Crystal Microphones, Moving Coil (Dynamic) Microphones, Ribbon (Velocity) Microphones, Capacitor Microphones, Electret Microphones, Gun Microphones, Lavalier Microphones, Tie-clip Microphones, Wireless Microphones.

Headphones and Headsets: Types of Headphones, Moving-iron Headphone, Crystal Headphones, Dynamic Headphones, Electrostatic Phones, Electrets, Electrostatic Headphones, Hearing Impairments, Audiometry, Hearing Aids.

Unit III: Ideal Loudspeaker, Basic Loudspeaker, Crystal Loudspeakers, Electrostatic (Condenser/Capacitor) Loudspeakers, Dynamic Loudspeakers, Permanent Magnet Loudspeakers, Loudspeaker Construction, Permanent Magnet, Voice Coil, Loudspeaker Impedance, Acoustic Impedance and Resonance, Woofers, Mid-range and Extended-range Speakers, High Frequency Loudspeakers

List of Practical:

1. To study various types of cables and connectors used in audio systems.
2. To study frequency response of various wired microphones
3. To study frequency response of wireless microphone
4. To study frequency response of headset
5. Study and repair of hearing aid
6. To study frequency response of Mid-range speakers
7. To study frequency response of woofers
8. To study frequency response of high frequency speakers
9. To repair and assemble the speakers
10. To repair and analyse professional speakers having voice coil
11. To study and understand PA system and its controls
12. To study various speaker enclosures.

Text/Reference Books:

1. Philip Newell, Elsevier. Recording studio design, Oxford, Focal Press
2. Strutt, John Williams, Baron. The Theory of sound Rayleigh
3. Fahy, Frank Foundations of Engineering Acoustics. Academic Press
4. S. P. Bali, Consumer Electronics

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