

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 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 <i>Students will try to learn:</i>	Course Learning Outcomes <i>After successful completion of the course student will be able to:</i>
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 flow 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 at <http://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.howstuck.com>
5. www.geocities.com/CapeCanaveral/1221/elec1.htm
6. <http://101science.com/electronics.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. 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 8051 microcontroller: 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:

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1. M.I.T. open course ware video lectures are available at <http://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.howstuffworks.com>
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. <http://101science.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.gloolab.com/links/links.html

B.Sc. PART III - SEMESTER VI

(Elective)

(Approved in BoS Meeting held on 24.03.2026 to be implemented from the academic Session 2026-27)

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
	By the end of this course, students will learn to:	After successful completion of the course, students will be able to:
1	Understand and explain the architecture, features, and memory	Identify and describe the 8086 architecture, registers, and memory segmentation.

	organization of the 8086 microprocessor.	
2	Analyze and apply the operating modes, instruction formats, and addressing modes of 8086.	Apply and demonstrate the use of 8086 instruction sets and addressing modes in programming.
3	Develop and implement assembly language programs using arithmetic, logical, branching, and control flow instructions.	Design and implement assembly programs using logical, arithmetic, branching, and loop instructions.
4	Illustrate and evaluate stack operations, I/O addressing, subroutines, macros, and interrupt handling in 8086 programming.	Analyze and evaluate stack operations, subroutines, macros, and interrupt handling for efficient program execution.
5	Explore and appreciate the fundamentals of Internet of Things (IoT), its architecture, technologies, and applications.	Explain and assess IoT frameworks, components, and technologies, and illustrate real-world IoT applications.

Unit I: 8086 Architecture: Features of 8086, 8086 architecture and pin configuration, concept of pipelining. Memory addresses space and data organization, memory segmentation, Register organization: Segment registers, IP & Data registers, Pointer, Index registers, flag register. Default and specified segment register, Memory addresses generation.

Unit II: Operating mode of 8086: Minimum and maximum mode of 8086. 8086 Instruction Set: 8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 instruction set: 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. Flag control instructions, compare instruction, intra-segment and intersegment branching, Branching related addressing mode. Control flow instructions, Loops & loop handling instructions. 8086 programming using these instructions.

Unit IV: Unconditional and conditional JUMP instruction and programming. The 8086-stack segment its initialization and stack related instructions. 8086 I/O Address space and IN and OUT instruction, concept of subroutine and subroutine related instruction CALL and RET.

Unit V: Procedure & Macros: Defining PROCEDURE (Directive used, FAR, NEAR). Concept of recursion, parameter passing in procedure. Concept of macro, Defining Macro (Directive used), advantages and disadvantages, Basic assembly level program 8086 using subroutines and macros. 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, components of IOT Advantages and disadvantages, 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 at <http://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.howstuffworks.com>
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. <http://101science.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/

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 at <http://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.howstuffworks.com>
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. <http://101science.com/electronics/electronics.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.gloalab.com/links/links.html

**B.Sc. PART III - SEMESTER VI
Vocational Skill Course (VSC)**

Course Name: **Practical Study of Microphones and Speakers**

Course code: **UEL362P**

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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