

**(For the students of B.Sc., Computer Science, Artificial Intelligence & Machine Learning,
Information Technology and Physics Courses)**

Admitted from 2026-2027 onwards

Second Year

**ALLIED 1
BASIC ELECTRONICS
(Theory)**

Semester III

Code:

Credit:4

COURSE OBJECTIVES:

1. To introduce basic concepts of Electric circuits and electronic components.
2. To impart thorough knowledge of semiconductor devices.
3. To develop circuit design approach.
4. To familiarise operational amplifier and their applications.
5. To gain knowledge of the concepts of digital systems.

UNIT I: BASIC CIRCUIT THEORY & COMPONENTS

Charge, current-voltage-resistance-power-Ohm's Law – KCL-KVL-resistor colour codes-series/parallel networks.

UNIT II: SEMICONDUCTOR DIODES & APPLICATIONS

Intrinsic/extrinsic semiconductors -P-N junction diode-V-I characteristics-Half-wave, full-wave rectifiers- Zener diodes and their use as voltage regulators.

UNIT III: TRANSISTORS & AMPLIFIERS

BJT-operation-configurations:Common Base, Common Emitter, Common Collector-Construction and characteristics of JFETs and MOSFETs-Basic amplifier- concepts of gain and feedback.

UNIT IV: OPERATIONAL AMPLIFIERS

Ideal op-amp characteristics-741 IC pinout-Inverting and non-inverting amplifier configurations-Summing amplifiers-voltage followers-integrators and differentiators.

UNIT V: DIGITAL ELECTRONICS

Binary, Octal, Decimal, and Hexadecimal number systems-Boolean algebra-Fundamental gates:AND, OR, NOT-universal gates NAND, NOR- Adders, multiplexers, flip-flops, and counters.

UNIT VI: CURRENT CONTOURS (FOR INTERNAL ASSESSMENT ONLY)

MOSFET -Metal Oxide Semiconductor Field Effect Transistor- nMOS and pMOS devices. Latches and clocking systems. Layout design rules and drawing Stick Diagrams.

COURSE OUTCOMES:

On the completion of this course, students will be able to:

CO1: Understand the fundamentals of Electrical components and its necessity.

CO2: Basics of semiconductor and its usage.

CO3: Apply transistor and devices for various purposes.

CO4: Design Op-Amp circuits for multiple purposes.

CO5: Derive necessary output from digital systems.

Text Books:

1. Principles of Electronics” by V.K.Mehta, Rohit Mehta, 2nd Edition, S.Chand Publications, 2020, ISBN-978935 28383 63.
2. Linear Integrated Circuits “D. Roy Choudhury, Shail B. Jain” New Age International Pvt Ltd, 7th Edition (2023-2024).
3. Digital Electronics by “Atul P. Godse and Dr. Mrs. Deepali A. Godse” Technical publications 2022. ISBN 978-93-5009-701-7.

Reference Books:

1. Grob’s Basic Electronics” by Mitchell E Scultz, 10th Edition – 2017, ISBN-13: 97807 063 4329.
2. Modern Digital Electronics: “R. P. Jain”, McGraw Hill, 5th Edition, 2022. ISBN-13. 978-9355321770.

e- books Links:

<https://www.gacbe.ac.in/images/E%20books/Bird%20-%20Electrical%20Circuit%20Theory%20and%20Technology%202nd%20Rev.pdf>

Semester	Course Code			Title of the Paper						
III	AC-1			BASIC ELECTRONICS						
Course Outcomes↓	Programme Outcomes (PO)									
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	3	3	2	3	2	2	3	3	3
CO-2	3	3	3	2	2	3	2	3	3	3
CO-3	3	3	3	2	3	3	2	2	3	3
CO-4	3	3	3	3	2	2	2	2	3	3
CO-5	3	3	3	3	3	2	3	2	3	3

*3-Strong; 2-Medium; 1-Low

Second Year	ALLIED 2	Semester IV
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	ADVANCED ELECTRONICS	
Code:	(Theory)	Credit:4

COURSE OBJECTIVES:

1. To study on-chip memories and their families.
2. To know the fundamentals of Intel 8085 microprocessor.
3. To acquire knowledge on Hardware of 8051 microcontroller.
4. To analyze the working of sensor and know the implementation procedure.
5. Explore how robotics improve accuracy, productivity, and operational efficiency in manufacturing and other high-risk environments.

UNIT 1: COMPUTER MEMORY FUNDAMENTALS

Primary memory -SRAM, -DRAM secondary memory – SSD -HDD-Cache memory, virtual memory, and the concept of memory organization- ROM, PROM, EPROM, and EEPROM architectures and applications.

UNIT II: 8085 MICROPROCESSORS

Internal block diagram of 8085- Pin Configuration-Address bus, data bus, control signals, and multiplexing concepts. -instruction set - Addressing modes - assembly language fundamentals, simple programs.

UNIT III: 8051 MICRO CONTROLLERS

Salient Features of 8051 Microcontroller - Standard 8-bit architecture - Block Diagram- internal components - CPU Registers - Memory Organization- Harvard Architecture -External Memory Interface -Pin Configuration- I/O Ports.

UNIT IV: SENSORS AND TRANSDUCERS

Definitions of sensor, transducer, and actuator - active vs. passive sensors - Static and dynamic characteristics- Electromechanical, temperature, optical, and proximity sensors - Analog-to-Digital Conversion - digital signal filtering for sensor data.

UNIT V: ROBOTICS ENGINEERING

Degrees of Freedom (DOF) - types of joints, and links-forward kinematics, inverse kinematics, and reference coordinate systems- Electric, pneumatic, and hydraulic drive systems.

UNIT VI: CURRENT CONTOURS(For internal assessment only)

Introduction to platforms like Arduino IDE for hardware prototyping–IoT-Internet of Things

COURSE OUTCOMES:

On completion of this course, student will be able to:

CO1: Acquire knowledge of memories.

CO2: Understand the complete details about 8085 microprocessor.

CO3: Analyze on-chip description of 8051 microcontroller.

CO4: Mind-Map for sensors and their various application.

CO5: Create and apply the phenomenon of Robotics.

Text Books:

1. “Padranabis .D”, Sensors and Transducers, 2nd edition, 2003, PHI Publications.
2. Krishna kant”, Microprocessors and microcontrollers: Architecture, Programming and system Design, 8085, 8086, 8051, 8096, (PHI, 2013) ISBN-13: 978-8120348530.
3. “K. J. Ayala”, The 8051 Microcontroller architecture, programming and applications (Delmar Cengage Learning, 2004) ISBN-13: 978-031420188.

Reference Books:

1. “Water Lang”, Sensors and Measurement systems, 2nd edition, 2024, River Publishers.
2. “M. A. Mazidi, J. G. Mazidi” and “R. D. McKinlay”, The 8051 Microcontroller and Embedded Systems: Using Assembly and C, 2nd Ed. (Pearson Education,

e- book Links:

1. Preview: Sensors and Actuators | SWAYAM
2. <https://www.javatpoint.com/microprocessor-applications>
3. <https://www.watelectronics.com/what-is-a-microprocessor-architecture-types-its-applications/>

Semester	Course Code			Title of the Paper						
IV	AC-2			ADVANCED ELECTRONICS						
Course Outcomes↓	Programme Outcomes (PO)									
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10
CO-1	3	3	3	2	3	2	2	3	3	3
CO-2	3	3	3	2	2	3	2	3	3	3
CO-3	3	3	3	2	3	3	2	2	3	3
CO-4	3	3	3	3	2	2	2	2	3	3
CO-5	3	3	3	3	3	2	3	2	3	3

*3-Strong; 2-Medium; 1-Low

Second Year	ALLIED PRACTICAL	semester III & IV
	GENERAL ELECTRONICS	
Code:	(Lab)	Credit:4

COURSE OBJECTIVES:

- 1.To impart the practical skills to test the circuits
- 2.To familiarize the basic characteristics of electronic components and digital systems.

Any sixteen (16) Experiments

1. Verification of ohm's law.
2. Verification of Kirchoff's of laws.
3. V- I Characteristics of a PN junction diode.
4. Half wave rectifier using diode.
5. Full wave rectifier using diode.
6. Zener diode as a voltage regulator.
7. CB configuration of a transistor.
8. CE configuration of a transistor.
9. Inverting amplifier using Op-Amp IC741.
10. Non inverting amplifier using Op-Amp IC741.
11. Adder circuit using Op-Amp IC741.
12. Integrated differentiator using ha opampic 741
13. Verification of Basic logic gates.
14. NAND gate as a Universal gate.
15. NOR gate as a Universal gate.
16. Half adder/Full adder circuits.
17. Flip-Flop circuit.
18. 8-bit addition using microprocessor 8085.
19. 8-bit subtraction using 8085 microprocessors.
20. Data transfer using 8085 microprocessors.
21. Ascending order program using 8085 microprocessors.
22. Descending order program using 8085 microprocessors.
23. LDR characteristics.
24. Photo diode characteristics.

COURSE OUTCOMES:

- CO1.**Learn all the basic Circuit ideas.
- CO2.**Gain knowledge of 8085 microprocessor programming and applications.