

# 16AE402 ELECTRONICS AND MICRO CONTROLLERS

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	W/RA	SSH/HS	CS	SA	S	BS
45	-	30	5	40	2	8	5	5



## Course Description and Objectives:

This course offers fundamental concepts of electronics and operational features of various electronic components. The objective of this course is to impart knowledge on basic principles of electronic components, devices, microcontrollers and processors that are commonly used in automotive applications.

## Course Outcomes:

The student will be able to:

- gain knowledge and hands on experience on various electronic components and their working
- understand the requirement and choose an appropriate electronic component for the need
- program a microcontroller for a specified application or operation
- program and control different actuators or stepper motors with the help of a microcontroller
- interface analog/digital devices to a given system and read data from it

## SKILLS:

*Differentiate between different electronic components (diodes, rectifiers, etc)*

*Implement a circuit using transistors and amplifiers*

*Perform analog to digital and digital to analog operations using converters*

*Program 8085 microcontroller for a given task*

*Interface a sensor or measuring device to a microcontroller and read its data*

**ACTIVITIES:**

- Differentiate between different electronic components (diodes, rectifiers, etc)
- Differentiate Implement a circuit using transistors and amplifiers
- Perform analog to digital and digital to analog operations using converters
- Program 8085 microcontroller for a given task
- Interface a sensor or measuring device to a microcontroller and read its data

**UNIT - 1****L- 9**

**SEMICONDUCTORS AND RECTIFIERS:** Classification of solids based on energy band theory, Intrinsic semiconductors, extrinsic semiconductors, P type and N type, P-N Junction, Zener effect, Zener diode characteristics, Half wave and full wave rectifiers, Voltage regulation

**UNIT - 2****L- 9**

**TRANSISTORS AND AMPLIFIERS:** Bipolar junction transistor, CB, CE, CC configuration and their characteristics, Biasing circuits, Class A, B and C amplifiers, Field effect transistor: characteristics of FET amplifier, SCR, DIAC, TRIAC, UJT: characteristics and simple applications, Switching transistors, Concept of feedback: negative feedback, Application in temperature and motor speed control

**UNIT - 3****L- 9**

**DIGITAL ELECTRONICS:** Binary number system, AND, OR, NOT, NAND, NOR circuits, Boolean algebra, Exclusive OR gate, Flip flops, Half and full adders, Registers, Counters, Analog/Digital and Digital/Analog conversion

**UNIT - 4****L- 9**

**8085 MICROPROCESSOR:** Block diagram of microprocessor, Architecture of 8085, Pin configuration, Instruction set, Addressing modes, Simple programs using arithmetic and logical operations

**UNIT - 5****L- 9**

**INTERFACING AND APPLICATIONS OF MICROPROCESSORS:** Basic interfacing concepts, Interfacing of input and output devices, Applications of microprocessor temperature control, Stepper motor, Traffic light control, etc.

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

Time: 30hours

**Electronics**

1. VI characteristics of P-N Junction diode
2. VI Characteristics of Zener diode
3. Characteristics of CE transistor
4. Characteristics of JFET
5. Characteristics of uni junction transistor
6. RC or Wein Bridge Oscillator
7. Study of logic gates (basic gates)
8. Half adder and full adder
9. Shift registers and counters
10. Operational amplifier (Adder, subtractor, differentiator, integrator, inverting and non-inverting)

**MICROPROCESSOR**

11. Block transfer
12. 8 Bit addition and subtraction
13. Multiplication and division
14. Maximum and minimum block of data sorting
15. 6 stepper motor interfacing

**TEXT BOOKS:**

1. Leach, "Digital Principals and Applications", Tata McGraw-Hill Education, 2006
2. V. K. Mehta, "Principles of Electronics", S. Chand & Co, 2008.

**REFERENCE BOOKS:**

1. Dougler.V.Hall, "Microprocessor and Interfacing, Programming and Hardware", Tata McGraw-Hill, 2006.
2. Ramesh Goankar, "Microprocessor Architecture, Programming and Applications with 8085", Wiley Eastern, 1998.
3. Ajay.V.Deshmukh, "Microcontroller Applications", Tata McGraw-Hill, 2005.