ANDHRA KESARI UNIVERSITY
MINOR

Subject: Electronics

w.e.f. AY 2023-24 COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	II	1	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
II	III	2	Semiconductor devices and Materials	3	3
			Semiconductor devices and Materials Practical Course	2	1
	IV	3	Electrical and electronics instrumentation	3	3
			Electrical and electronics instrumentation Practical Course	2	1
		4	Microprocessor system	3	3
			Microprocessor system Practical Course	2	1

SEMESTER-III

COURSE 2: SEMICONDUCTOR DEVICES AND MATERIALS

Theory Credits: 3 3 hrs/week

Objective:

1. To provide basic knowledge and concepts of Semiconductor materials and devices.
2. To facilitate students learn on the physical principles and operational characteristics of Semiconductor devices and some of its important applications. Pre-requisites: Basic understanding of semiconductors.

Outcomes:

- Ability to apply basic concepts of Inorganic and Organic Semiconductor materials forelectronic device application in modern electronic industry.
- Detailed knowledge of various classifications and applications to VLSI, LEDs and solarcells.
- Holistic view of the latest progress in two-dimensional (2D)-one-dimensional (1D) andnano materials.
- Emphasis on nano-electronic applications such as Schottky barrier transistors, flexibleElectronics.

Unit I: (12 Hours)

Inorganic and Organic Semiconductor: Energy bands, carrier transport, mobility, drift-diffusivity, excess carrier, injection and recombination of the excess carriers, carrier statistics; High field effects: velocity saturation, hot carriers and avalanche breakdown.

Unit II: (12 Hours)

Majority carrier Devices: MS contacts rectifier and non-rectifier, MIS structures, MESFET, hetero-junction, HEMT and band diagrams, I-V and C-V characteristics.

Unit III: (12 Hours)

MOS structures: Semiconductor surfaces; The ideal and non-ideal MOS capacitor band diagrams and CVs; Effects of oxide charges, defects and interface states. MOSFET: Structures and Device Characteristics, Short-Channel effects. Charge coupled Devices (CCDs), application to VLSI.

Unit IV: (12 Hours)

Nonvolatile Memory Device. Optoelectronic Devices: solar cell, photo detectors, LEDs, laser diodes. Nano structures and concepts: quantum wells, supper lattice structures, nanorod, quantum dot, CNTs, 2D materials: grapheme, BN, MoS_2 etc, matamaterials.

UNIT-V: (12 Hours)

Multistage Amplifiers: BJT at high frequencies, frequency response of RC coupled amplifiers and transformer coupled amplifier.

Reference Books

1. Donald A. Neamen, Semiconductor Physics and Devices Basic

Principles, 3rdedn.McGraw-Hil (2003)
2. B.G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6thEdn., PrenticeHall, 2006.
3. S. M. Sze and Kwok K. Ng Physics of Semiconductor Devices, Wiley (2013).
4. M. Hussa, A. Dimoulas and A. Molle, 2D Materials for NanoElectronics, CRC press(2016)
5. M.S.Tyagi, Introduction to Semiconductor Materials and Devices, Willey, StudentEdition

SEMESTER-III

COURSE 2: SEMICONDUCTOR DEVICES AND MATERIALS

Practical Credits: 1 2 hrs/week

List of Experiments

1. To study the Hall Effect: determine the Hall coefficient, type of semiconductor andcarrier concentration in the given semiconductor sample.
2. To study the four probe method: calculate the resistivity and energy band gap of givensemiconductor sample.
3. To determine the resistivity of the given semiconductor specimen using Vander Pauwmethod.
4. To design a MOSFET as switching regulator for given duty cycle and plot the current-voltage (I-V) characteristic of MOSFET using Keithley.
5. To design a phase controlled rectifier using SCR and plot the I-V characteristic of SCRusing Keithley.
6. To design a relaxation oscillator using UJT and plot the I-V characteristic of UJT usingKeithley.
7. I-V characteristics measurement of a p-n diode/LEDs using Keithley - calculate itsideality factor.

SEMESTER-IV

COURSE 3: ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Theory Credits: 3 3 hrs/week

The students will learn :

a. basic concepts of indicating instruments.

b. various electronic instruments such as CRO, storage oscilloscopes, functiongenerators, spectrum analyzer etc.,

c. transducers, sensors and display devices.

UNIT-I

DC and AC indicating Instruments: Accuracy and precision - Types of errors - PMMC galvanometer, sensitivity, Loading effect - Conversion of Galvanometer into ammeter, Voltmeter and Shunt type ohmmeter- Multimeter.

Electrodynamometer - Thermocouple instrument - Electrostatic voltmeter - Watt-hour meter.

UNIT-II

DC and AC bridges: Wheatstone bridge - Kelvin's bridge - Balancing condition for AC bridge - Maxwell's bridge - Schering's bridge - Wein's bridge - Determination of frequency.

UNIT-III

Oscilloscopes: Block diagram - Deflection Sensitivity - Electrostatic Deflection - Electrostatic Focusing - CRT Screen - Measurement of Waveform frequency, phase difference and Time intervals - Sampling Oscilloscope - Analog and Digital Storage Oscilloscopes.

UNIT-IV

Instrumentation Amplifiers and Signal Analysers: Instrumentation amplifier - Electronic Voltmeter and Multimeter - Digital Voltmeter - Function Generator - Wave Analyser - Fundamentals of Spectrum Analyser.

UNIT-V

Transducer and Display Devices: Strain Gauge - Unbounded Strain Gauge - LVDT - Resistance Thermometer - Photoelectric Transducer - Pen Recorder - Audio Tape Recorder - Seven Segment Display - LCD.

Text Books

1. Electronic Instrumentation and Measurement Techniques - *W.D. Cooper & A.D. Helfrick*, Prentice Hall of India.

2. Electronic Instrumentation and Measurement - *Kalasi*.

Reference Books

1. A Course in Electrical and Electronic Measurement and Instrumentation - *A.K. Sawhney*, Dhanpat Rai and Sons.

2. Electronic Instrumentation and Measurements - *P.B. Zbar*, Mc Graw Hill International.

3. Measurement Systems Application and Design - *Ernest O. Doebelin*, 4/e, TataMcGraw Hill Publishing Co. LTD

SEMESTER-IV

COURSE 4: MICROPROCESSOR SYSTEMS

Theory Credits: 3 3 hrs/week

OBJECTIVES:

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheralchipsinvolving system design.
- To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors
- To understand RISC based microprocessors.
- To understand concept of multi core processors.

UNIT -I: (12Hrs)

CPU ARCHITECTURE *Introduction to Microprocessor, INTEL -8085(P) Architecture, CPU, ALU unit, Register organization, Address, data and control Buses. Pin configuration of 8085. Addressing modes* 8086 Microprocessor: Architecture, Pin description. Instruction format, Instruction Executiontiming, Addressing modes

UNIT -II: (12 Hrs)

8085 Instruction Set:

Data transfer Instruction, Logical Instructions, Arithmetic Instructions, Branch Instructions,Machine Control instructions.

UNIT -III: (12Hrs)

Assembly Language Programming using 8085, Programmes for Addition, Subtraction, Multiplication,Division, largest and smallest number in an array. BCD to ASCII and ASCIIto BCD.

UNIT -IV: (12Hrs)

Basic 8086 Configurations – Minimum mode and Maximum Mode, Interrupt Priority Management I/O Interfaces: Serial Communication interfaces, Parallel Communication, Programmable Timers, Keyboard and display, DMA controller

UNIT -V: (12Hrs) ARM PROCESSOR: Introduction to 16/32 bit processors, Arm architecture& organization, Arm based MCUs, Programming model, Instruction set.

TEXTBOOKS:

1. Microprocessor Architecture, Programming and Applications

2. with the 8085 – PenramInternational Publishing, Mumbai.- Ramesh S. Gaonakar
3. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and Glenn SA Gibson

4. Microcontrollers Architecture Programming, Interfacing and System Design

– Raj Kamal Chapter: 15.1, 15.2, 15.3, 15.4.1

5. 8086 and 8088 Microprocessor by Tribel and avatar singh

REFERENCES:

1. Microprocessors and Interfacing – Douglas V.Hall

2. Microprocessor and Digital Systems – Douglas V. Hall

3. Advanced Microprocessors & Microcontrollers - B.P.Singh & Renu Singh – New Age

4. The Intel Microprocessors – Architecture, Programming and Interfacing – Bary B.Brey.

5. Arm Architecture reference manual –Arm ltd.

OUTCOMES:

- The student can gain good knowledge on microprocessor and implement in practicalapplications
- Design system using memory chips and peripheral chips for 16 bit 8086microprocessor.
- Understand and devise techniques for faster execution of instructions, improve speedof operations and enhance performance of microprocessors.
- Understand multi core processor and its advantages
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SEMESTER-IV

COURSE 4: MICROPROCESSOR SYSTEMS

Practical Credits: 1 2 hrs/week

List of Experiment

Programs using Intel 8085 /8086

1. Addition and Subtraction (8 bit and 16-bit)
2. Multiplication and Divition (8-bit)
3. Largest number in an array.
4. Smallest number in an array.
5. BCD to ASCII and ASCII to BCD .
6. Program To Convert Two Bcd Numbers In To Hex
7. Program To Convert Hex Number In To Bcd Number.
8. Program To Find The Square Root Of A Given Number.
9. Interfacing Experiments Using 8086 Microprocessor (Demo):

1. Traffic Light Controller
2. Elevator,
3. 7-Segment Display

ANDHRA KESARI UNIVERSITY-ONGOLE, PRAKASAM DISTRICT

Minor Programme from the Year 2023-24 Onwards

Programme-B.Sc. Honours Electronics - Question Paper model,

Second Year-Semester-III & IV

Time: 3 Hours Total Marks: 75

PART –A

Out of Ten Answer any Five of the following

5X10=50 Marks

1.

2.

3.

4.

5.

6.

7.

8.

9.

10

PART –B

Answer Any Five of the following **5x5=25 Marks**

11.
12.
13.
14.
15.
16.
17.
18.
19.
20.