ANDHRA KESARI UNIVERSITY

Programme: B.Sc. Honours in Electronics (Major)

w.e.f. AY 2023-24

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2	4
	I	2	Advances in Mathematical, Physical and Chemical Sciences	3+2	4
	II	3	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
	II	4	Circuit theory and electronic devices	3	3
			Circuit theory and electronic devices Practical Course	2	1
II	III	5	Semiconductor devices and Materials	3	3
			Semiconductor devices and Materials Practical Course	2	1
		6	Digital Electronics	3	3
			Digital Electronics Practical Course	2	1
		7	Analog Electronics	3	3
			Analog Electronics Practical Course	2	1
		8	Electronic communication system	3	3
			Electronic communication system Practical Course	2	1
	IV	9	Electrical and electronics instrumentation	3	3
			Electrical and electronics instrumentation Practical Course	2	1
		10	Micro control system	3	3
			Micro control system Practical Course	2	1
		11	Microprocessor system	3	3
			Microprocessor system Practical Course	2	1

SEMESTER-III

COURSE 5: 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:

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:

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:

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:

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:

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, 3rd edn.McGraw-Hil (2003)
2. B.G. Streetman and Sanjay Banerjee, Solid State Electronic Devices, 6th Edn., 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 5: 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-III

COURSE 6: DIGITAL ELECTRONICS

Theory Credits: 3 3hrs/week

Objectives:

- To understand the number systems, Binary codes and Complements.
- To understand the Boolean algebra and simplification of Booleanexpressions.
- To analyze logic processes and implement logical operations usingcombinational logic circuits.
- To understand the concepts of sequential circuits and to analyzesequential systems in terms of state machines.
- To understands characteristics of memory and their classification.
- To implement combinational and sequential circuits using VHDL.

Unit – I

NUMBER SYSTEM AND CODES: Decimal, Binary, Hexadecimal, Octal. Codes: BCD, Gray and Excess-3 codes- code conversions- Complements (1's, 2's,9's and 10's), Addition -Subtraction using complement methods.

Unit- II

BOOLEAN ALGEBRA AND THEOREMS: Boolean Theorems, De-Morgan's laws. Digital logic gates, Multi level NAND & NOR gates. Standard representation of logic functions (SOPand POS), Minimization Techniques (Karnaugh Map Method: 2,3 variables).

Unit-III

COMBINATIONAL DIGITAL CIRCUITS:

Adders-Half & full adder, Subtractor-Half and full subtractors, Parallel binary adder, Magnitude Comparator, Multiplexers (4:1)) and Demultiplexers (1:4), Encoder (8- line-to-3- line) and Decoder (3-line-to-8-line). IC-LOGIC FAMILIES: TTL logic, CMOS Logic families(NAND&NOR Gates).

UNIT-IV

SEQUENTIAL DIGITAL CIRCUITS:

Flip Flops: S-R FF , J-K FF, T and D type FFs, Master-Slave FFs, Excitation tables, Registers:- Serial In Serial Out and Parallel In and Parallel Out, Counters Asynchronous-,Mod-8,Mod- 10,Synchronous-4-bit &Ring counter.

UNIT-

MEMOR

Y

DEVICES

:

General Memory Operations, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAROM,

TEXT BOOKS:

1. M.Morris Mano, " Digital Design " 3rd Edition, PHI, New Delhi.

2. Ronald J. Tocci. “Digital Systems-Principles and Applications” 6/e. PHI.New Delhi. 1999.(UNITS I to IV)
3. G.K.Kharate-Digital electronics-oxford universitypress
4. S.Salivahana&S.Arivazhagan-Digital circuits and design
5. Fundamentals of Digital Circuits by Anand Kumar Reference Books :
1. Herbert Taub and Donald Schilling. “Digital Integrated Electronics” .McGraw Hill. 1985.
2. S.K. Bose. “Digital Systems”. 2/e. New Age International. 1992.
3. D.K. Anvekar and B.S. Sonade. “Electronic Data Converters :Fundamentals & Applications”. TMH. 1994.
4. Malvino and Leach. “ Digital Principles and Applications”. TMG Hill Edition.

Outcomes: -

- ✓ Develop a digital logic and apply it to solve real life problems.
- ✓ Analyze, design and implement combinational logic circuits.
- ✓ Classify different semiconductor memories.
- ✓ Analyze, design and implement sequential logic circuits.
- ✓ Simulate and implement combinational and sequential logic circuits using VHDL

SEMESTER-III

COURSE 6: DIGITAL ELECTRONICS

Practical Credits: 1 2 hrs/week

LAB LIST:

1. Verification of IC-logic gates
2. Realization of basic gates using discrete components (resistor, diodes & transistor)
3. Realization of basic gates using Universal gates (NAND & NOR gates)
4. Verify Half adder and full adder using gates
5. Verify Half subtractor and full subtractor using gates.
6. Verify the truth table Multiplexer and demultiplexer.
5. Verify the truth table Encoder and decoder.
6. Verify the truth table of RS , JK, T-F/F using NAND gates
7. 4-bit binary parallel adder and subtractor using IC 7483
8. BCD to Seven Segment Decoder using IC -7447/7448

SEMSTER-III
COURSE 7: ANALOG ELECTRONICS

Theory Credits: 4 5 hrs/week

a. the design and working of RC coupled amplifiers, transformer coupled amplifier sand power amplifiers,

b. the concept of negative and positive feedback,

c. pulse shaping and Schmitt trigger, and

d. the op-amp characteristics, frequency response and its linear and non-linear applications.

UNIT-I

Amplifiers: General principles of small signal amplifiers - Classifications - RC Coupled amplifiers - Gain - Frequency response - Input and output impedance - Multistage amplifiers - Transformer coupled amplifiers - Equivalent circuits at low, medium and high frequencies – Emitter follower.

Class A and Class B power amplifiers - Single ended and push-pull configurations - Power dissipation and output power calculations.

UNIT-II

Feedback Amplifiers: Basic concept of feedback amplifiers - Transfer gain with feedback - General characteristics of negative feedback amplifier - Effect of negative feedback on gain - Gain stability - Distortion and bandwidth - Input and output resistance in the case of various types of feedback - Analysis of voltage and current in feedback amplifier circuits.

UNIT-III

Operational Amplifiers: Principles - Transfer characteristics - Various offset parameters - Differential gain - CMRR - Slew rate – Bandwi

UNIT-IV

Op-amp Circuits: Basic operational amplifier circuits under inverting and non- inverting modes - Adder - Subtractor - Integrator - Differentiator - Comparator - Sine, square and triangular waveform generators - Active filters - Sample and Hold circuits.

UNIT-V

Oscillators: Positive feedback - Stability issues - Feedback requirement of oscillations -

Barkhausen criterion for oscillation - Hartley, Colpitts, Phase shift and Wien bridge oscillators - Condition for oscillation and frequency derivation - Crystal oscillator - UJT relaxation oscillator. Monostable, bistable and astable multivibrators - Schmitt trigger.

Text Books

1. Introduction to Integrated Electronics - *V. Vijayendran*, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2005.

2. Electronic Circuits and Systems - *Y.N. Bapat*, Tata McGraw Hill Publishing Co. Ltd.

Reference Books

1. Electronic Devices and Circuits - *G.K. Mithal*, Khanna Publishers, Delhi.

2. Hand Book of Electronics - *Gupta & Kumar*, Pragati Prakashan, Meerut.

3. Electronic Devices and Circuit Theory - *R. Boylestad & L. Nashelsky*, Prentice Hallof India Private Limited, 6/e.

4. Electronic Devices and Circuits - *J.P. Agarwal & Amit Agarwal*, PrakasamPublishers.

5. Linear Integrated Circuits - *D. Roy Choudhury & Shail Jain*, New Age International (P) Limited.

SEMESTER-III

COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS

Theory Credits: 3 3 hrs/week

The students will learn :

a. fundamentals of antenna, their characteristics and types,

b. amplitude modulation and demodulation and radio wave transmission andreception,

c. frequency modulation and demodulation and FM radio wave transmission andreception,

d. Principle of analog and digital pulse modulation and their applications,

e. transmission and detection of digital signals.

UNIT-I

Antenna - Effective resistance - Efficiency - Directive gain - Bandwidth, Beam widthand polarization - Dipole - Folded dipole - Arrays - Yagi - Uda - Helical - Discone - Parabolic - Dish Antennas - Ground wave, sky wave and space ware propagation - Skip distance - Maximum usable frequency.

UNIT-II

Modulation - Needs for Modulation - Types of Modulation - Amplitude Modulation - Generation and detections circuits - Balanced Modulator - DSB/SC and SSB Modulation - VSB modulation. Block diagram of AM Radio transmitter and super heterodyne Receiver.

UNIT-III

Frequency Modulation - Definition - Derivation of Modulated wave - Generation of FM - Varactor diode and Reactance tube Modulators - Detectors - Balanced slope detector, Foster Seeley discriminator, ratio detector - Block diagram of FM transmitter and receiver.

UNIT-IV

Pulse Modulation - Sampling theorem - PAM, PWM, , PCM - quantizing, sampling, coding, decoding, quantization error, delta modulation and adaptive delta modulation.

UNIT-V

Multiplexing - FDM, TDM, CDMA - ASK, FSK, PSK –Advantages of DigitalCommunication - Introduction to Microwave, Fiber optic, Satellite Communications
- RADAR - range equation.

Text Books

1. Electronic Communication Systems - *George Kennedy*, McGraw Hill BookCompany, 4/e, 2005.

2. Communication Engineering - *T.G. Palanivelu*, Anuradha Publicatons, 1/e, 2002.

Reference Books

1. Communication System - *Roddy & Coolen*, 4/e, Pearson Education, 2005.

2. Principles of Communication Engineering - *Anok Singh*, 4/e, SathyaprakasamPublications, 2004.

3. Electronic Communication Systems *Wayne Tomasi*, 4/e, Pearson Education, 2004.

SEMESTER-IV

COURSE 9: ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Theory Credits: 4 5 hrs/week

The students will learn :

a. basic concepts of indicating instruments.

b. various electronic instruments such as CRO, storage oscilloscopes, function generators, 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 10: MICRO CONTROLLER SYSTEM

Theory Credits: 3 3 hrs/week

OBJECTIVES:

- To understand the concepts of micro controller based system.
- To enable design and programming of micro controller based system.
- To know about the interfacing Circuits.

UNIT-I: (10Hrs) Introduction, comparison of Microprocessor and micro controller, Evolution of microcontrollers from 4-bit to 32 bit , Development tools for micro controllers, Assembler-Compiler-Simulator/Debugger.

UNIT -II: (10Hrs)

Microcontroller Architecture: Overview and block diagram of 8051, Architecture of 8051, program counter and memory organization, Data types and directives, PSW register, Registerbanks and stack, pin diagram of 8051, Port organization, Interrupts and timers.

UNIT-III:(10Hrs)

Addressing modes, instruction set of 8051: Addressing modes and accessing memory usingvarious addressing modes, instruction set: Arithmetic, Logical, Simple bit, jump, loop and call instructions and their usage. Time delay generation and calculation, Timer/Counter Programming,

Unit -IV: (15Hrs)

Assemble language programming Examples: Addition, Multiplication, Subtraction, division, arranging a given set of numbers in largest/smallest order.

UNIT-V : (15Hrs)

Interfacing and Application of Microcontroller: Interfacing of – PPI 8255, DAC (0804), Temperature measurement (LM35), interfacing seven segment displays, displaying information on a LCD, control of a stepper Motor (Uni-Polar),

TEXT BOOKS:

1. The 8051 microcontroller and embedded systems using assembly and
c- kennet j. Ayalam,Dhananjay V. gadre, cengage publishers

2. The 8051 microcontrollers and Embedded systems - By Muhammad Ali

Mazidi and JaniceGillispie Mazidi – Pearson Education Asia, 4th Reprint, 2002.

REFERENCE BOOKS:

1. Microcontrollers Architecture Programming, Interfacing and System Design – Rajkamal.

2. The 8051 Microcontroller Architecture, Programming and Application - Kenneth J.Ajala , west publishing company (ST PAUL, NEW YORK, LOS ANGELES, SAN FRANCISCO).

3. Microcontroller theory and application-Ajay V.

Deshmukh OUTCOMES:

- The student can gain good knowledge on microcontrollers and implement in practicalapplications
- learn Interfacing of Microcontroller
- get familiar with real time operating system

SEMESTER-IV

COURSE 10: MICRO CONTROLLER SYSTEM

Practical | Credits: 1 | 2 hrs./week

LAB LIST:

1. Addition And Subtraction Of Two 8-Bit Numbers.
2. Multiplication And Division Of Two 8-Bit Numbers.
3. Largest number /smallest in an array.
4. Exchange Of Higher And Lower Nibbles In Accumulator.
5. Addition Of Two 8-Bit Numbers (Keil Software).
6. Addition Of Two 16-Bt Numbers (Keil Software)
7. Subtraction Of Two 8-Bit Numbers (Keil Software).
8. Subtraction Of Two 16-Bit Numbers (Keil Software).
9. Multiplication Of Two 8-Bit Numbers (Keil Software).
11. Program For Swapping And Compliment Of 8-Bit Numbers (Keil Software).
12. Program To Find The Largest Number In Given Array (Keil Software).
13. Program To Find The Smallest Number In Given Array (Keil Software).
14. Interfacing Led To 8051 Microcontroller (Keil Software).
15. Interfacing Buzzer To 8051 Microcontroller (Keil Software).
16. Interfacing Relay To 8051 Microcontroller (Keil Software).
17. Interfacing Seven Segments To 8051 Microcontroller (Keil Software).

SEMESTER-IV

COURSE 11: 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:

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:

8085 Instruction Set:

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

UNIT -III:

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:

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: 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

SEMESTER-IV

COURSE 11: 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

Single Major 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.