ANDHRA KESARI UNIVERSITY ::ONGOLE

Model Syllabus for 4-Year UG Honours in B.Sc. (Electronics) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

COURSE STRUCTURE (for Semester I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Fundamental of Electricity and Electronics	3	3
			Fundamental of Electricity and Electronics Practical Course	2	1
		2	Circuit theory and Electronic Devices	3	3
			Circuit theory and Electronic Devices Practical Course	2	1
	II	3	Semiconductor Devices and Materials	3	3
			Semiconductor Devices and Materials Practical Course	2	1
		4	Digital Electronics	3	3
			Digital Electronics Practical Course	2	1
II	III	5	Analog Circuits and Communication	3	3
			Analog Circuits and Communication Practical Course	2	1
		6	Microprocessor System	3	3
			Microprocessor System Practical Course	2	1
		7	Electrical and Electronics Instrumentation	3	3
			Electrical and Electronics Instrumentation Practical Course	2	1
	IV	8	Electronic Communication System	3	3
			Electronic Communication System Practical Course	2	1
		9	Microcontroller and Interfacing	3	3
			Microcontroller and Interfacing Practical Course	2	1
		10	Computer Network	3	3

SEMESTER - III

COURSE 5: ANALOG CIRCUITS AND COMMUNICATION

Theory **Credits: 3** **3 hrs/week**

Unit – I (9 hrs)

OPERATIONAL AMPLIFIERS: Definition, Characteristics of Op-Amp, Block diagram of op-amp, inverting, noninverting, virtual ground, summing amplifier, subtractor, voltage follower, op-amp parameters, voltage to current convertor, integrator, differentiator, differential amplifier, Logarithmic amplifier.

Unit – II (9 hrs)

OP-AMP CIRCUITS: voltage regulator, comparator, zero cross detecting circuit, instrumentation amplifier, sine wave generator, square wave generator (Astable multi vibrator), triangular wave generator, Active filters (Basics)-low pass, high pass, band pass filters.

IC-555 –functional block diagram and mention it's applications

Unit –III (9 Hrs) AMPLITUDE MODULATION:

Need for modulation, amplitude modulation-analysis of an amplitude modulated wave, side bands and bandwidth, power relations in the AM wave. Generation of AM- Transistor modulators. Detection of AM signals – Diode detector.

Unit - IV (9 hrs) FREQUENCY MODULATION:

Theory of FM, Frequency deviation and carrier swing, modulation index, deviation ratio, percent modulation. Mathematical representation of FM, frequency spectrum and bandwidth of FM waves, Generation of FM signals – Varactor diode modulator and Basic Reactance modulator. Detection of FM waves – FM demodulation with discriminator. Advantages of FM over AM.

Unit - V (9 hrs) RADIO BROADCASTING AND RECEPTION:

Spectrum of electromagnetic waves, Radio broadcasting and reception, Transmitter, Radio receiver, AM receivers- Straight forward receiver, Superheterodyne receiver. FM receivers.

TEXT BOOKS:

1. Op Amp and Linear Integrated Circuits By Ramakant Gaykwad
2. Linear Integrated Circuits By Roy Choudhary
3. Unified Electronics Vol II – J.P. Agarwal and Amit Agarwal.
4. Electronic Communications - George Kennedy
5. Antennas and Wave Propagation – G.S.N. Raju – PHI
6. Principles of communication system –Herbert Taub & D.L. Schilling

Reference Books :

1. Jacob Millan, Micro Electronics, McGraw Hill.
2. Mithal G K, Electronic Devices and Circuits Thana Publishers.
3. Allan Motter shead ,Electronic Devices and Circuits – An Introduction- Prentice Hall
4. Electronic Communications – Roody & Colen
5. Communication Systems – Hayken--- 4th Edition
6. Modern digital and analog communication system –B.P. Lathi

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SEMESTER - III

COURSE 5: ANALOG CIRCUITS AND COMMUNICATION

Practical **Credits: 1** **2 hrs/week**

Lab Experiments:

1. Op-Amp as inverting and non-inverting
2. Op-Amp Voltage follower and current follower.
3. Op-Amp as integrator and differentiator
4. Op-Amp as adder & subtractor
5. Op-Amp as voltage to current converter
6. Op-Amp as square wave generator
7. Amplitude modulation and demodulation.
8. Frequency modulation and demodulation.
9. AM Transmitter and Receiver.
10. FM Transmitter and Receiver.

SEMESTER - III

COURSE 6: MICROPROCESSOR SYSTEMS

Theory **Credits: 3** **3 hrs/week**

Course Objectives:

1. To understand basic architecture of 16 bit and 32 bit microprocessors.
2. To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
3. To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors
4. To understand RISC based microprocessors.
5. To understand concept of multi core processors.

UNIT -I: (9 hrs)

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 Execution timing, Addressing modes

UNIT -II: (9 hrs)

8085 Instruction Set:

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

UNIT -III: (9 hrs)

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

UNIT -IV: (9 hrs)

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: (9 hrs)

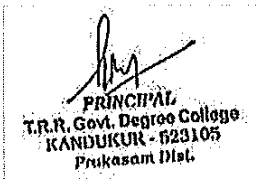
ARM PROCESSOR: Introduction to 16/32 bit processors, Arm architecture & organization, Arm based MCUs, Programming model, Instruction set.

TEXTBOOKS:

1. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International
2. 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
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.



SEMESTER - III

COURSE 6: MICROPROCESSOR SYSTEMS

Practical **Credits: 1** **2 hrs/week**

1. The student can gain good knowledge on microprocessor and implement in practical applications
2. Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.
3. Understand and devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors.
4. Understand multi core processor and its advantages

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):
10. Traffic Light Controller, Elevator, 7-Segment Display

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SEMESTER - III

COURSE 7: ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Theory **Credits: 3** **3 hrs/week**

Students will learn :

1. Basic concepts of indicating instruments.
2. Various electronic instruments such as CRO, storage oscilloscopes, function generators, spectrum analyzer etc.,
3. Transducers, sensors and display devices.

UNIT-I (9 Hrs)

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 (9 Hrs)

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 (9 Hrs)

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 (9 Hrs)

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

UNIT-V (9 Hrs)

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, Tata Mc Graw Hill Publishing Co. LTD

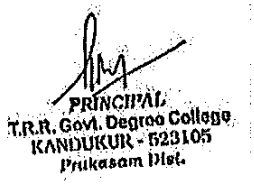
SEMESTER - III

COURSE 7: ELECTRICAL AND ELECTRONIC INSTRUMENTATION

Practical **Credits: 1** **2 hrs/week**

PRACTICAL SYLLABUS:

1. Familiarization of digital multimeter and its usage in the measurements of (i) resistance (ii) current, (iii) AC & DC voltages
2. Measure the AC and DC voltages, frequency using a CRO and compare the values measured withother instruments like Digital multimeter.
3. Formation of Sine, Square wave signals on the CRO using Function Generator andmeasure their frequencies. Compare the measured values with actual values.
4. Display the numbers from 0 to 9 on a single Seven Segment Display module by applying voltages.
5. A.C - Impedance and Power Factor.
6. Maxwell's Bridge – Determination of Inductance.
7. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.



SEMESTER - IV

COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS

Theory **Credits: 3** **3 hrs/week**

The students will learn :

1. fundamentals of antenna, their characteristics and types,
2. amplitude modulation and demodulation and radio wave transmission and reception,
3. frequency modulation and demodulation and FM radio wave transmission and reception,
4. Principle of analog and digital pulse modulation and their applications,
5. transmission and detection of digital signals.

UNIT-I (9 Hrs)

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 (9 Hrs)

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 (9 Hrs)

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 (9 Hrs)

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

UNIT-V (9 Hrs)

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

Text Books

1. Electronic Communication Systems - *George Kennedy*, McGraw Hill Book Company, 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, Sathya prakasam Publications, 2004.
3. Electronic Communication Systems *Wayne Tomasi*, 4/e, Pearson Education, 2004.

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SEMESTER - IV

COURSE 8: ELECTRONIC COMMUNICATION SYSTEMS

Practical **Credits: 1** **2 hrs/week**

Students can do the Practicals from available resources

SEMESTER - IV

COURSE 9: MICRO CONTROLLER & INTERFACING

Theory **Credits: 3** **3 hrs/week**

COURSE OBJECTIVES:

1. To understand the concepts of microcontroller based system.
2. To enable design and programming of microcontroller based system.
3. To know about the interfacing Circuits.

UNIT-I: (9 Hrs)

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: (9 Hrs)

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

UNIT-III:(9 Hrs)

Addressing modes, instruction set of 8051: Addressing modes and accessing memory using various 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: (9 Hrs)

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

UNIT-V : (9 Hrs)

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 Janice Gillispie 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

SEMESTER - IV

COURSE 9: MICRO CONTROLLER & INTERFACING

Practical **Credits: 1** **2 hrs/week**

COURSE OUTCOMES:

1. The student can gain good knowledge on microcontrollers and implement in practical applications
2. learn Interfacing of Microcontroller
3. get familiar with real time operating system

LIST OF EXPERIMENTS:

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).
10. Program For Swapping And Compliment Of 8-Bit Numbers (Keil Software).
11. Program To Find The Largest Number In Given Array (Keil Software).
12. Program To Find The Smallest Number In Given Array (Keil Software).
13. Interfacing Led To 8051 Microcontroller (Keil Software).
14. Interfacing Buzzer To 8051 Microcontroller (Keil Software).
15. Interfacing Relay To 8051 Microcontroller (Keil Software).
16. Interfacing Seven Segments To 8051 Microcontroller (Keil Software).

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SEMESTER - IV

COURSE 10: COMPUTER NETWORK

Theory **Credits: 3** **3 hrs/week**

Course Objectives

The students will learn :

1. provides a general introduction to computer networking that would be useful to all personnel who deal with distributed systems,
2. Encompassing both technical and managerial aspects.
3. To help students better understand the challenges and opportunities faced by modern business,
4. topics include LAN and WAN implementations, the Internet and internet applications.

UNIT-I (9 Hrs)

Network structure Point to Point, Broadcast, Multicast - Horizontal and vertical distribution - Star, Mesh, tree, bus structures - OSI 7 layer model - Architecture - Functions of layers - Packet switches, circuit switching and message switching.

UNIT-II (9 Hrs)

Physical layer - Transmission media - Channel allocation methods - ALOHA, S- ALOHA, FINITE ALOHA - LAN Protocols IEEE802.3, 802.4, 802.5, 802.6 and 802.11.

UNIT-III (9 Hrs)

Data link layer - Framing - Error detection - Error correction - CRC - Stop and wait - Go band N - Sliding window Protocol - Selective repeat.

UNIT-IV (9 Hrs)

Network layer - Routing algorithms and congestion control algorithms - Repeaters, Bridges, Routers and Gateways, Inter networking - Introduction to transport layer and session layer.

UNIT-V (9 Hrs)

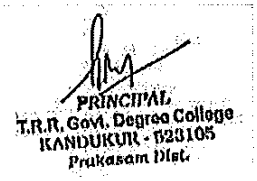
Presentation layer - coding, compression and cryptography - Introduction to Application layer - High performance networks - ATM, Fast Ethernet, FDDI, DQDB, SONET and SDH.

Text Books

1. Computer Networks - *Andrew S. Tanenbaum*, 4/e, Pearson Education, 2005.
2. Data and Computer Communication - *W. Stallings*, 7/e, Pearson Education, 2006.

Reference Books

1. Introduction to Data Communications and Networking - *Behrouz & Forouzan*,4/e, McGraw Hill Book Company, 2004.
2. Telecommunication Networks - Protocols Modeling and Analysis - *Misha Stewartz*,2/e, Pearson Ed



SEMESTER - IV

COURSE 10: COMPUTER NETWORK

Practical | **Credits: 1** | **2 hrs/week**

Students can do the Practicals as per the available resources