ANDHRA UNIVERSITY
B. Sc ELECTRONICS SYLLABUS UNDER CBCS

Semester	Paper	Subject	IA	ES	Total
SEMESTER I	I	CIRCUIT THEORY AND ELECTRONIC DEVICES	25	75	100
		Lab	50	0	50
SEMESTER II	II	Digital Electronics	25	75	100
		Lab	0	50	50
SEMESTER III	III	Analog Circuits and Communication	25	75	100
		Lab	50	0	50
SEMESTER IV	IV	MICROPROCESSOR SYSTEMS	25	75	100
		Lab	0	50	50
	V	MICRO CONTROLLER AND INTERFACING	25	75	100
		Lab	0	50	50

B.Sc. Electronics Syllabus under CBCS

w.e.f. 2020-21 (revised in June 2020)

SEMESTER-1 **PAPER – I**

CIRCUIT THEORY AND ELECTRONIC DEVICES

Objectives:

- To explain the basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
- To analyze circuits in time and frequency domain.
- To synthesize the networks using passive elements.
- To understand the construction, working and VI characteristics of electronic devices.
- To understand the concept of power supply.

UNIT- 1: (12Hrs)

SINUSOIDAL ALTERNATING WAVEFORMS:

Definition of current and voltage. The sine wave, general format of sine wave for voltage or current, phase relations, average value, effective (R.M.S) values. Differences between A.C and D.C. Phase relation of R, L and C

UNIT-II: (12hrs)

PASSIVE NETWORKS AND NETWORKS THEOREMS (D.C):

Branch current method, Nodal Analysis, star to delta & delta to star conversions. Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power, Milliman and Reciprocity theorems.

UNIT-III: (12hrs)

RC, RL AND RLC CIRCUITS:

Frequency response of RC and RL circuits, their action as low pass and high pass filters. Passive differentiating and integrating circuits. Series resonance and parallel resonance circuits, Q – Factor.

UNIT-IV: (12hrs)

BJT, FET and UJT:

BJT: Construction, working, and characteristics of CE Configurations. Hybrid parameters and hybrid equivalent circuit of CE Transistor,

FET: Construction, working and characteristics of JFET and MOSFET. Advantages of FET over BJT.

UJT: Construction, working and characteristics of UJT. UJT as a Relaxation oscillator.

UNIT-V:(12hrs)

POWER SUPPLIES & PHOTO ELECTRIC DEVICES

Rectifiers: Half wave, full wave rectifiers-Efficiency-ripple factor- Filters- L-section&π-section filters. Three terminal fixed voltage I.C. regulators(78XX and &79XX). Light Emitting Diode – Photo diode and LDR.

TEXT BOOKS:

1. Introductory circuit Analysis (UBS Publications) ---- **Robert L. Boylestad.**
2. Electronic Devices and Circuit Theory --- **Robert L. Boylestad & Louisashelsky.**
3. Circuit Analysis by **P.Gnanasivam- Pearson Education**
4. Electronic Devices and Circuit Theory --- **Robert L. Boylestad & Louis Nashelsky.**
5. Electronic Devices and Circuits I **– T.L.Floyd- PHI Fifth Edition**

REFERENCE BOOKS:

1. Engineering Circuit Analysis **By: Hayt & Kemmerly - MG.**
2. Networks and Systems – **D.Roy Chowdary.**
3. Unified Electronics (Circuit Analysis and Electronic Devices) **by Agarwal- Arora**
4. Electric Circuit Analysis- **S.R. Paranjothi**- New Age International.
5. Integrated Electronics – **Millmam & Halkias.**
6. Electronic Devices & Circuits – **Bogart.**
7. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd

Outcomes:-

- ✓ Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems including the use of computer simulation.
- ✓ Apply time and frequency concepts of analysis.
- ✓ Synthesize the network using passive elements.
- ✓ Know about amplifier circuits, switching circuits and oscillator circuits their design and use in electronics.
- ✓ Design and construction of a power supply.

ELECTRONICS LAB-I

(Circuit Theory and Electronic Devices)

LAB LIST:

1. Thevenin's Theorem-verification
2. Norton's Theorem-verification
3. Maximum Power Transfer Theorem-verification
4. LCR series resonance circuit.
5. BJT input and output characteristics
6. FET Output and transfer characteristics
7. UJT VI characteristics
8. LDR characteristics
9. IC regulated power supply(IC-7805)

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

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SEMESTER – II **PAPER – 2**

Digital Electronics

Objectives:

- To understand the number systems, Binary codes and Complements.
- To understand the Boolean algebra and simplification of Boolean expressions.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines.
- To understands characteristics of memory and their classification.
- To implement combinational and sequential circuits using VHDL.
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Unit – I (12hrs)

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 (12hrs)

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

Unit-III (12hrs)

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 (12hrs)

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-(12hrs)

MEMORY 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 university press
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

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ELECTRONICS LAB-2

(DIGITAL ELECTRONICS LAB)

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.
7. Verify the truth table Encoder and decoder.
8. Verify the truth table of RS , JK, T-F/F using NAND gates
9. 4-bit binary parallel adder and subtractor using IC 7483
10. BCD to Seven Segment Decoder using IC -7447/7448

Lab experiments are to be done on breadboard and simulation software (using multisim) and output values are to be compared and justified for variation.

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2nd YEAR

SEMESTER – III **PAPER – 3**

Analog Circuits and Communication

OBJECTIVES:

- **T**o understand the concepts, working principles and key applications of linear integrated circuits.
- To perform analysis of circuits based on linear integrated circuits.
- To design circuits and systems for particular applications using linear integrated circuits.
- To introduce students to various modulation and demodulation techniques of analog communication.
- To analyse different parameters of analog communication techniques.
- It also focuses on Transmitters and Receivers.

Unit – I (12hrs)

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:(12hrs)

OP-AMP CIRCUITS: voltage regulator, comparator, zero cross detecting circuit, instrumentation amplifier, Schmitt trigger. sine wave generator, square wave generator, 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 (12Hrs) AMPLITUDE MODULATION:

Need for modulation, amplitude modulation-frequency spectrum of AM wave, representation of AM, power relations in the AM wave. Generation of AM- Transistor modulators. Detection of AM signals – Diode detector.

UNIT-IV (12hrs) 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 Reactance modulator. Detection of FM waves – FM demodulation with discriminator.

UNIT-V (12hrs) RADIO BROADCASTING AND RECEPTION:

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

TEXT BOOKS:

1. Op Amp and Linear Integrated Circuits By Ramakant Gaykwad
2. Linear Integrated Circuits By Roy Choudary
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

OUTCOMES:

- ✓ Understand the fundamentals and areas of applications for the integrated circuits.
- ✓ Analyze important types of integrated circuits.
- ✓ Demonstrate the ability to design practical circuits that perform the desired operation.
- ✓ Select the appropriate integrated circuit modules to build a given application.
- ✓ Use of different modulation and demodulation techniques used in analog communication.
- ✓ Identify and solve basic communication problems.
- ✓ Analyze transmitters and receiver circuits.

Electronics Lab - 3

(Analog Circuits and Communication)

LAB LIST:

1. Op-Amp as inverting and non-inverting
2. OpAmp 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. AM Transimitter and Receiver.
9. FM Transmitter and Receiver.

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2nd YEAR

Semester-IV **Paper- IV**

I

TITLE: MICROPROCESSOR SYSTEMS

OBJECTIVES:

- To understand basic architecture of 16 bit and 32 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving 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 Execution timing, 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 ASCII to 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.

TEXT BOOKS:

1. Microprocessor Architecture, Programming and Applications with the 8085 – Penram International Publishing, Mumbai.- Ramesh S. Gaonakar
2. Microcomputer Systems the 8086/8088 family – YU-Cheng Liu and Glenn SA Gibson
3. Microcontrollers Architecture Programming, Interfacing and System Design

   – **Raj Kamal Chapter: 15.1, 15.2, 15.3, 15.4.1**
4. 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 practical applications
- Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.
- Understand and devise techniques for faster execution of instructions, improve speed of operations and enhance performance of microprocessors.
- Understand multi core processor and its advantages

ELECTRONICS LAB-IV

MICROPROCESSOR SYSTEMS

LAB LIST:

Programs using Intel 8085 /8086

1. Addition and Subtraction (8 bit and 16-bit)
2. Multiplication and Division (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

B.Sc. Electronics CBCS Syllabus
2nd YEAR

IV SEMESTER **Paper: V**

MICRO CONTROLLER AND INTERFACING

OBJECTIVES:

- To understand the concepts of microcontroller based system.
- To enable design and programming of microcontroller 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, Register banks 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 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: (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 Janice Gillispie Mazidi – Pearson Education Asia, 4th Reprint, 2002.

REFERENCE BOOKS:

1. Microcontrollers Architecture Programming, Interfacing and System Design – **Raj Kamal.**

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 practical applications

- learn Interfacing of Microcontroller
- get familiar with real time operating system

ELECTRONICS LAB-V
MICROCONTROLLER LAB

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).

REVISED UG SYLLABUS UNDER CBCS
(From Academic Year 2020-21)
PROGRAMME: FOUR YEAR B.Sc.

Domain Subject: **Electronics**
Skill Enhancement Courses (SECs) for Semester V,
From 2022-23 (Syllabus - Curriculum)

Structure of SECs for Semester – V
(To Choose One pair from the Three alternate pairs of SECs)

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6A	Industrial Electronics	3+3	25	75	3+2	100+50
7A	Electronic Instrumentation	3+3	25	75	3+2	100+50

OR

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6B	Embedded systems design	3+3	25	75	3+2	100+50
7B	Consumer Electronics	3+3	25	75	3+2	100+50

OR

Courses 6 & 7	Name of the Course	Theory + Practicals Hrs/Week	IA Marks	EA Marks	Credits	Marks (Th+Pr)
6C	VLSI Design	3+3	25	75	3+2	100+50
7C	Data Communication and Networking	3+3	25	75	3+2	100+50

Note-1: For Semester–V, for the domain subject Electronics, any one of the above three pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (A, B, C allotment is random, not on any priority basis).

Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc.
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V

Course 6A: Industrial Electronics

(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills in using instruments like Rectifiers, Multimeters, Power supplies, Voltage Regulators etc. through hands-on experience.
4. Understand the Principle and operation of different Electronic Heating devices.

***II.* Syllabus:** *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

Syllabus:

UNIT-I (20 hours)
Rectifiers and filters: Rectifiers– Half wave, full-wave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and section filters.
Voltage Regulators: Transistor Series voltage regulator - Transistor Shunt voltage regulator – Three terminal regulators (78XX and 79XX).

UNIT-II (10 hours)
Power Supplies: Block diagram of regulated power supply – A simple regulated transistorized power supply (circuit and working) – Principle and working of switch mode power supply (SMPS).

UNIT-III (10 hours)
Voltage Multipliers: Half wave voltage doubler, Full wave voltage doubler, Voltage Tripler circuit diagram and working mentioning of applications of voltage multipliers.

UNIT-IV (10 hours)
Controlled rectifiers: SCR Half wave rectifier circuit, working with wave forms, mathematical analysis for resistive load - SCR Full wave rectifier circuit, working with wave forms, mathematical analysis for resistive load – SCR as inverter parallel and series circuits.

UNIT-V (10 hours)
Heat effects: Resistance, inductance and dielectric heating. Principle of operations and its applications.

Reference Books:

1. Unified Electronics Volume II by J.P Agarwal and Amit Agarwal.
2. Industrial Electronics, S.B. Biswas, Dhanapur Rai & Sons.
3. Industrial Electronics, G.K. Mithal, Khanna Publishers.
4. Electronic Devices and Circuits – G.K. Mithal.
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel - TMH

ELECTRONICS: LAB – 6A

Industrial Electronics

(ANY SIX EXPERIMEMTS SHOULD BE DONE)

1. D.C Power supply and filters.
2. Transistor series regulator
3. Transistor as a shunt regulator
4. Voltage regulator using IC-7805and IC-7905.
5. Voltage doubler using diodes
6. Voltage Tripler using diodes
7. SCR VI characteristics.
8. SCR Series inverter
9. SCR parallel inverter.

Model Question Paper

PAPER - 6A : **Industrial Electronics**
(w.e.f. 2022-23)

Time: 3 hours **Max. Marks: 75**

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1.
2.
3.
4.
5.
6.
7.
8.
9.
10

Part B (5x10=50 Marks)

Answer the following

11.

(OR)

12.

13.

(OR)

14.

15.

(OR)

16.

17.

(OR)

18.

19.

(OR)

20.

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc. - Semester – V
Course 7A: Electronic Instrumentation (Skill Enhancement Course (Elective), 3+2 Credits) Max. Marks: Theory:100 + Practical:50

I. Learning Outcomes: Students after successful completion of the course will be able to:1.

1. Identify various facilities required to set up a basic Instrumentation Laboratory.
2. Acquire a critical knowledge of various Electrical Instruments used in the Laboratory.
3. Demonstrate skills of using instruments like CRO, Function Generator, Multimeter etc. through hands on experience.
4. Understand the Principle and operation of different display devices used in the display systems and different transducers
5. Comprehend the applications of various biomedical instruments in daily life like B.P. meter, ECG, Pulse oxymeter etc. and know the handling procedures with safety and security.

II. Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Training, Unit tests etc.)*

UNIT-I *Introduction To Instruments* (10 hrs)

Types of electronic Instruments - Analog instruments & Digital Instruments, DC Voltmeter and AC Voltmeter, Construction and working of an Analog Multimeter and Digital Multimeter (Block diagram approach), Sensitivity, 3½display and 4½ display Digital multimeters, Basic ideas on Function generator.

UNIT-II *Oscilloscope* (10 hrs)

Cathode Ray Oscilloscope-Introduction, Block diagram of basic CRO, Cathode ray tube, Electron gun assembly, Screen for CRT, Time base operation, Vertical deflection system, Horizontal deflection system, Use of CRO for the measurement of voltage (AC and DC), frequency, phase difference, Different types of oscilloscopes and uses.

UNIT-III *Transducers* (10 hrs)

Classification of transducers, Selection of transducers, Resistive, capacitive & inductive transducers, Resistive and capacitive touch screen transducer used in mobiles, Displacement transducer-LVDT, Piezoelectric transducer, Photo transducer, Digital transducer, Fibre optic sensors

UNIT-IV *Display Instruments* (10 hrs)

Introduction to Display devices, Seven Segment Displays, LED Displays, Construction and operation (Display of numbers),Types of SSDs (Common Anode & Common Cathode type), Limitations of SSDs, Liquid Crystal Displays, Applications of LCD modules.

UNIT-V *Biomedical Instruments* (10 hrs)

Basic operating principles and uses of (i) Clinical thermometer (ii) Stethescope (iii) Sphygmomanometer (iv) ECG machine (v) Radiography (vi) Ophthalmoscope (vii) Ultrasound scanning (viii) Pulse oxymeter (ix) Glucometer, Basic ideas of CT scan and MRI scan.

Reference Books:

1. Electronic Instrumentation by H.S.Kalsi , TMH Publishers
2. Electronic Instrument Hand Book by Clyde F. Coombs , McGraw Hill
3. Introduction to Biomedical Instrumentation byMandeep Singh, PHI Learning.

4. Biomedical Instrumentation and Measurements by Leslie Cromwell ,Prentice Hall India.
5. Electronic Measurements and Instrumentation by Kishor, K Lal, Pearson, New Delhi
6. Electrical and Electronic Measurements by Sahan, A.K., Dhanpat Rai, New Delhi
7. Electronic Instruments and Measurement Techniques by Cooper, W.D. Halfrick, A.B., PHI Learning, New Delhi
8. Web sources suggested by the teacher concerned and the college librarian including reading material.

Course 7A: Electronic Instrumentation– PRACTICAL SYLLABUS

(30 Hrs. Max Marks: 50)

III. Learning Outcomes: On successful completion of this practical course, student shall be able to:

1. List out, identify and handle various equipment in Instrumentation Laboratory or Electronic Laboratory.
2. Learn the construction, operational principles of various instruments.
3. Demonstrate skills in handling, Maintenance & troubleshooting of different instruments used in the Labs.
4. Acquire skills in observing and measuring various electrical and electronic quantities.
5. Perform some techniques related to Biomedical Instrumentation and measurement of Certain physiological parameters like body temperature, B.P. and sugar levels etc.

IV. Practical (Laboratory) Syllabus: *(30 hrs. Max marks: 50*)

1.. Familiarisation of digital multimeter and its usage in the measurements of (i) resistance, (ii) current, (iii) AC & DC voltages and for (i) continuity test (ii)diode test and (iii) transistor test.

2.Measure the AC and DC voltages, frequency using a CRO and compare the values Measured with other instruments like Digital Multimeter.

3. Formation of Sine, Square wave signals on the CRO using Function Generator and measure 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. Display the letters **a** to **h** on a single Seven Segment Display module by applying voltages.
6. Measurement of body temperature using a digital thermometer and list out the error and corrections.
7. Measurement of Blood Pressure of a person using a B.P. meter And record the values and analyze them.
8. Get acquainted with an available ECG machine and study the ECG pattern to understand the meaning of various peaks

9. Observe and understand the operation of a Digital Pulse oxymeter and measure the pulse rate of different people and understand the working of the meter.

Lab References**:**

1. Electronic Measurement and Instrumentation by J.P. Navani. ,S Chand & Co Ltd
2. Principles of Electronic Instrumentation by A De Sa, Elsevier Science Publ.
3. Electronic Measurements and Instrumentation by S.P.Bihari, YogitaKumari, Dr. Vinay Kakka, Vayu Education of India.
4. Laboratory Manual For Introductory Electronics Experiments by Maheshwari, New Age
5. International (P) Ltd., Publishers.
6. Electricity-Electronics Fundamentals: A Text-lab Manual by Paul B. Zbar
7. ,Joseph Sloop, & Joseph G. Sloop, McGraw-Hill Education.
8. Web sources suggested by the teacher concerned.

Co-Curricular Activities

(a) Mandatory:(*Training of students by the teacher in field related skills: (lab:10 + field:05*)

1.**For Teacher**: Training of students by the teacher in the laboratory/field for not less than 15 hours on the field techniques/skills of understanding the operation, Maintenance and utility of various electrical and electronic instruments both in the Laboratory as well as in daily life.

For Student: Students shall (individually)visit a local electrical and electronics shop or small firm to familiarize themselves with the various electrical and electronic instruments available in the market and also to understand their functionality, principle of operation and applications as well as the troubleshooting of these instruments.(Or) The student shall visit a diagnostic centre and observe the ECG machine and the ECG pattern(Or) Student shall visit a diagnostic centre and observe the CT scan and MRI scan.(Or) Students shall visit a mobile smartphone repair shop and observe the different components on the PCB(Motherboard), different ICs (chips) used in the motherboard and troubleshooting of touch screens in smartphones.

Observations shall be recorded in a hand-written Fieldwork/Project work not exceeding 10 pages in the given format to be submitted to the teacher.

2. Max marks for Fieldwork/Project work: 05.

3.Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of a place visited, observations, findings and acknowledgments*.

4.Unit tests (IE)

Suggested Co-Curricular Activities

1. Training of students by related industrial/technical experts.
2. Assignments (including technical assignments like identifying different measuring instruments and tools and their handling, operational techniques with safety and security.
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Make your own stethoscope at home.
5. Making a seven-segment display at home.
6. Preparation of videos on tools and techniques in various branches of instrumentation.

7. Collection of material/figures/photos related to products of Measuring Instruments, Display Modules and Biomedical Instruments and arrange them in a systematic way in a file.

8. Visits to Instrumentation Laboratories of local Universities or Industries like Cement, Chemical or Sugar Plants etc. or any nearby research organizations, private firms, etc.

9. Invited lectures and presentations on related topics by Technical /industrial experts

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Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V
Course 6B: Embedded systems design (Skill Enhancement Course (Elective), 3+2 Credits) Max. Marks: Theory:100 + Project:50

UNIT 1: (10Hrs)

Introduction to Embedded Systems:
Embedded systems overview, Design Challenge, Processor Technology, IC Technology, and Design Technology.

UNIT 2: (15Hrs)

Custom Single Purpose Processor – Hardware Development: Introduction, Combinational logic, Sequential logic, Custom Single Purpose Processor Design, RT-Level Custom Single-Purpose Processor.

UNIT 3: (15Hrs)

General Purpose Processor – Software Development: Introduction, Basic Architecture, Operation, Programmer's View, ASIPs, and Development Environment: Host and Target Machines, Linker / Locators for Embedded Software, Getting Embedded Software into the target system. Debugging Techniques: Testing on your Host Machine, and Instruction Set Simulators.

UNIT 4: (10Hrs)

RTWA for Embedded Systems: Introduction, Timers, Counters and Watchdog Timers, UART, Pulse Width Modulators, LCD Controllers, Keypad Controllers, Stepper Motor Controllers, Analog – to – Digital Converters, and Real Time Clocks.

UNIT 5: (10Hrs)

Advanced Communication Principles:Parallel Communication, Serial Communication, Wireless Communication, Serial Protocols: I^2C, CAN, FireWire, and USB. Parallel Protocols: PCI BUS and ARM BUS. Wireless Protocols: IrDA, Bluetooth, and IEEE 802.11.

TEXT BOOKS:

1. Embedded System Design – A Unified Hardware / Software Introduction By Frank Vahid / Tony Givargis – WILEY EDITION.

2. Embedded Systems Architecture, Programming and Design – 2nd Edition By Raj Kamal – Tata McGraw-Hill Education.

REFERENCES:

1. An Embedded Software Premier - David E- Siman, PEARSON
2. Education Embedded / real - time systems - DR. K.V.K.K. Prasad, dreamtech
3. The art of programming Embedded systems, Jack G. Ganssle, academic press
4. Intelligent Embedded systems, Louis L. Odette, Adison Wesly, 1991

Model Question Paper

PAPER-6B : **Embedded systems Design**

(w.e.f 2022-23)

Time: 3 hours Max. Marks: 75

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1. What are the components of an Embedded hardware system.
2. Explain the design challenges of Embedded systems.
3. Explain various steps to design a custom single-purpose processor.
4. Explain combinational logic circuit design.
5. Write a short note on the linker for embedded systems.
6. Briefly explain the operation of a general-purpose processor.
7. What is Watchdog Timer? Explain.
8. Explain the working of Real-time Clocks in embedded systems.
9. Write a short note on the I2C protocol.
10. Explain the working of Bluetooth protocol for wireless communication.

Part B (5x10=50 Marks)

Answer the following:

11. Draw the block diagram of an embedded system. Explain the features of Embedded Systems.

(OR)

12. Explain various technologies involved in designing an embedded system.
13. Explain (a) Combination logic and (b) Sequential logic circuits

(OR)

14. Explain in detail about RT Level custom single purpose processor.
15. Explain in detail about embedded software development tools.

(OR)

16. Explain various debugging techniques used in Embedded Systems.
17. Define and explain Universal asynchronous receiver transmitter (UART).

(OR)

18. Explain the working of Stepper motor controller for embedded systems.
19. Distinguish between parallel and serial communication Principles. Explain USB Serial Protocol.

(**OR)**

20. Write a short note on (a)PCI BUS and (b) ARM BUS

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V
Course 7B: Consumer Electronics
(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

Learning Outcomes:

- To study Microwave ovens – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study washing machines – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Air conditioners and refrigerators – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Home/Office digital devices – block diagram - working - types – wiring and safety instructions. – care and cleaning
- To study Digital access devices like – block diagram - working - types – wiring and safety instructions. – care and cleaning

Unit – I(12hrs)

Microwave Ovens – Microwaves (Range used in Microwave ovens) – Microwave oven block diagram – LCD timer with alarm – Single-Chip Controllers – types of Microwave oven – Wiring and Safety instructions – care and Cleaning.

Unit – II(12hrs)

Washing Machines – Electronic controller for washing machines – Washing machine hardware and software – Types of washing machines – Fuzzy logic washing machines Features of washing machines.

Unit – III(12hrs)

Air Conditioners And Refrigerators - Air Conditioning – Components of air conditioning systems – All water air conditioning systems – All air conditioning systems – Unitary and central air conditioning systems – Split air conditioners.

Unit – IV(12hrs)

Home/Office Digital Devices – Fascimile machine – Xerographic copier – calculators – Structure of a calculator – Internal organization of a calculator – Servicing electronic calculators – Digital clocks – Block diagram of a digital clock.

Unit – V(12hrs)

Digital Access Devices – Digital computer – Internet access – online ticket reservation – functions and networks – barcode scanner and decoder – Electronic Fund Transfer – Automated Teller Machines(ATMs) – Set-Top boxes – Digital cable TV – Video on demand.

TEXTBOKS:

1. S.P. Bali, Consumer Electronics – Pearson Education, New Delhi,2005.
2. R.G. Gupta Audio and Video systems Tata McGraw Hill (2004)

Learning outcomes:

- The Student can gain a good knowledge of microwave ovens and implement them in practical applications.
- The Student can gain a good knowledge of Washing Machines and implement in practical applications.
- The Student can gain a good knowledge of Air conditioners and Refrigerators and implement them in practical applications.
- The Student can gain a good knowledge of Digital access devices and implement in practical applications.
- Ability to measure strain, displacement, velocity, angular velocity , temperature, pressure Vacuum, and Flow.

Course 7B: Consumer Electronics

CONSUMER ELECTRONICS LAB

(At least two Activities should be done)

1. Study of PA systems for various situations – Public gathering, closed theatre/ Auditorium, Conference room, Prepare Bill of Material(Costing)
2. Installation of Audio/Video systems – site preparation, electrical requirements, cables and connectors
3. Market Survey of products (at least one from each module)
4. Identification of block and tracing the system. Assembly and Disassembly of system using Toolkit
5. Assembly and Disassembly of system and printer.

NOTE: one activity as directed in practical course is equivalent to 4 experiments.

Model Question Paper

PAPER- 7B : CONSUMER ELECTRONICS
(w.e.f 2022-23)

Time: 3 hours Max. Marks: 75

Part A (5 X 5 = 25 Marks)

Answer any FIVE of the following:

1. Explain the microwave oven safety instructions.
2. What are the uses of a microwave oven?
3. Explain the features of the washing machine.
4. Explain the different types of washing machines.
5. Explain the working of the air conditioning system.
6. What is a unitary air conditioning system.
7. How servicing the electronic calculators.
8. What is facsimile machine? And give the two uses of it.
9. Explain the barcode scanner system.
10. How transfer the fund using ATM?

Part B (5x10=50 Marks)

Answer the following:

11. Draw the block diagram of the microwave oven and explain each block.

(OR)

12. Explain the LCD timer with alarm in the washing machine.
13. What is FUZZY logic washing machine.

(OR)

14. Explain the hardware details of washing machine.
15. Explain the different components of air-condition system.

(OR)

16. Explain the working of split air condition.
17. Draw the block diagram of digital clock and explain it.

(OR)

18. Draw the structure of calculator. And explain each one.
19. What is network and explain its online ticket reservation procedure.

(OR)

20. Explain the details about digital cable TV.

Semester-wise Revised Syllabus under CBCS, 2021 - 22

Domain Subject: **ELECTRONICS**

IV Year B.Sc., - Semester – V

Course 6C: VLSI DESIGN

(Skill Enhancement Course (Elective), 3+2 Credits)

Max. Marks: Theory:100 + Practical:50

UNIT-I (12 hrs)

Integrated Circuit- Definition, Classification's, and Advantages of IC's – MOS Transistors: Enhancement type, Depletion type, Modes of NMOS – CMOS, Fabrications: n-Well, p-Well.

UNIT-II (12 hrs)

NMOS Inverter – CMOS inverter – VLSI Design Flow: Design Specification's Design Entry – Examples of (Circuit Diagrams only) NMOS, PMOS and CMOS.

UNIT-III (12 hrs)

Basic logic gates in CMOS – Complex logic gate: Two, Three inputs of CMOS NAND gate – Combinational Logic: Two and Three inputs of CMOS NOR gate – Compound gates in CMOS.

UNIT-IV (10 hrs)

VHDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types.

Verilog HDL: Brief History, Logical, Relational, Arithmetic, Shift and Rotate Operators, Data types
– Comparison of VHDL and Verilog HDL.

UNIT-V (14 hrs)

Data – Flow Description's and HDL programs:-

Basic Logic Gates, Universal Gates, Half-Adder, Multiplexer, Magnitude Comparator, Binary Adder.

TEXT BOOKS

1. VLSI Design by Vilas S.Baged.
2. VHDL and Verilog programming By Nazeih M.Botros.
3. VLSI Design By A.Albert Raj and T.Latha.

ELECTRONICS : LAB – 6C

VHDL / Verilog HDL LAB

(any six experiments should be done)

1) BASIC GATES CIRCUIT
2) UNIVERSAL GATES
3) HALF –ADDER
4) FULL –ADDER
5) MULTIPLEXER
6) DECODER
7) S-R LATCH
8) D-LATCH
9) MAGNITUDE COMPARATOR
10) BINARY ADDER

Semester-wise Revised Syllabus under CBCS, 2020-21
Domain Subject: **ELECTRONICS**
IV Year B.Sc., - Semester – V

Course 7C: DATA COMMUNICATION AND NETWORKING

(Skill Enhancement Course (Elective), 3+2 Credits)
Max. Marks: Theory:100 + Practical:50

UNIT –I (12 Hrs):

Data Communication and its Components – Introducing of Network, Types of Networks: Personal Area Network, wide Area Network.

UNIT-II (14 hrs):

Network Topologies: Bus Topology, Star Topology, Ring Topology, Mesh Topology, Tree Topology, Hybrid, Topology.

UNIT-III (10 Hrs):

Transmission Media's - Guided Media: Twisted pair Cable, Coaxial Cable, Optical Fiber Cable. Un-Guide Media: Radio Waves, Microwaves, Infrared.

UNIT-IV (10 Hrs):

Data Transmissions: Digital – To – Digital Conversion (line coding only), Analog – To – Digital Conversion (PCM only), Digital – To – Analog (ASK only) Analog – To – Analog Transmission (AM only) – Transmission Modes (Parallel and Serial).

UNIT – V (14 Hrs):

Frequency Division Multiplexing, Time Division Multiplexing Wave Division Multiplexing. Modems: Traditional Modems, Cable Modems.

TEXT BOOKS

1. Data communication and Networking (2 Edition) By Behrouz A.Forouzan.
2. Data and Communication by Stallings Williams.
3. Computer Networks By Kurose James F

ELECTRONICS: LAB – 7C

DATA COMMUNICATION AND NETWORKING

(Any Six Experiments Should Be Done)

1. TO STUDY DIFFERENT TYPES OF TRANSMISSION MEDIA.
2. TO STUDY THE SERIAL INTERFACE USING RS-232.
3. TO STUDY LAN USING STAR TOPOLOGY
4. TO STUDY LAN USING BUS TOPOLOGY
5. TO STUDY LAN USING TREE TOPOLOGY
6. TO STUDY CONFIGURE MODEM OF COMPUTER
7. TO STUDY CONFIGURE HUB/SWITCH
8. Analog to Digital Conversion
9. Digital to Analog conversion