Dr. Babasaheb Ambedkar Marathwada University
Chhatrapati Sambhajinagar- 431001

Course Structure and Syllabus
for
B. Sc. Electronics (Second year)

(AS PER NEP-2020)

Effective from 2025-26

Prof M.D Shirsat
BoS Electronics
05/04/2025

Prof M.D. Shirsat
Dean
Faculty L S & T
05/04/2025

BSc Second Year: 3rd Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	SUB/DSC/T/ 200	SAC00102003T	Amplifiers	2		2		2+2+2+2 = 08
	SUB/DSC/T/ 201	SAC00102013T	Digital Electronics-II	2		2		
	SUB/DSC/P/ 226	SAC00102263P	Practical based on SUB/DSC/T/ 200		4		2	
	SUB/DSC/P/ 227	SAC00102273P	Practical based on SUB/DSC/T/ 201		4		2	
Minor (Choose any two from pool of courses) **It is from different discipline of the same faculty**	SUB/Mn/T/ 200	SCC00102003T	To be chosen from other discipline of same faculty	2		2		2+2 = 04
	SUB/Mn/T/ 201	SCC00102013T	To be chosen from other discipline of same faculty	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) **It should be chosen compulsorily from the faculty other than that of Major**	SUB/GE/OE/ T/200	SDC00102003T	To be chosen from other faculty	2		2		02
VSC (Vocational Skill Courses) (Choose any one from SUB/VSC/T/ 200 and SUB/VSC/T/ 201) and corresponding Practicals	SUB/VSC/T/ 200	SEC00102003T	Electrical Wiring	1		1		1+1 =02
	SUB/VSC/T/ 201	SEC00102013T	Digital Inverter-I	1		1		
	SUB/VSC/P/ 226	SEC00102263P	Practicals based on SUB/VSC/T/ 200		2		1	
	SUB/VSC/P/ 227	SEC00102273P	Practicals based on SUB/VSC/T/ 201		2		1	
AEC, VEC, IKS	SUB/AEC/T/ 200		**English** (Common for all the faculty)	2		2		2 + 2 = 04
	SUB/VEC/T/ 201		Environmental Studies	2		2		
OJT/ FP/CEP/CC/RP	SUB/CC/P/ 226		Cultural Activity / NSS,NCC (Common for all the faculty)		4		2	02
				15	**14**	**15**	**07**	**22**

Minor Courses for other Discipline

SUB/Mn/T/ 200 : This is a 2 credit theory course designed for other discipline **(Power Supplies)**

SUB/Mn/T/ 201 : This is a 2 credit theory course designed for other discipline **(Consumer Electronics –I)**

Generic /Open Elective Courses for other faculty

SUB/GE/OE/T/200 : This is a 2 credit theory course designed for other faculty **(Maintenance of Air Conditioners)**

SAC00102003T

SUB/DSC/T/200/ Amplifiers

Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives:

1. To introduce students to various fundamental concepts of Amplifiers.
2. To make them understand the concept of' binging for transistor amplifiers, small signal amplifiers. Feedback amplifiers, und multistage transistor amplifiers.
3. To enable students to design and construct circuits based of various small signal amplifiers, and multistage transistor amplifiers.

Course Outcomes (COs): After completion of course, students will be able to--

1. Apply the basic concepts of biasing for transistor amplifiers, small signal amplifiers, feedback amplifiers, and multistage transistor amplifiers to solve the complex problems in electronic circuit.
2. Analyze various transistor amplifiers, small signal amplifiers, feedback amplifiers, and multistage transistor amplifiers to identify various issues in Electronic circuits
3. Design various electronics circuits' circuit using concept of small signal amplifiers, and multistage transistor amplifiers,
4. Design and develop a cost effective electronic devices based on small signal amplifiers. and multistage transistor amplifiers

Unit-I: **10 Hrs.**

Bias for Transistor Amplifiers: Transistor load line analysis, operating point, Inherent variation of transistor parameters, Stabilization, essentials of transistor biasing circuit, stability factor, methods of transistor biasing, base resistor method, voltage divider bias method.

Unit-II: **12 Hrs.**

Small signal Amplifiers: Two port network, h-parameter equivalent circuit, equivalent circuit for BJT, trans conductance model, CE amplifier, CB amplifier, emitter follower circuit, equivalent circuit for JFET, Common Source amplifier, source follower amplifier, An amplifier black box with feedback. Stabilization of gain by negative feedback, effect of feedback on output resistance, effect of feedback on input resistance, voltage series feedback.

Unit-III: **08 Hrs.**

Multistage Transistor Amplifier: Multistage transistor amplifier, important terms: Gain, frequency response, decibel gain, bandwidth, RC coupled transistor amplifier, direct coupled amplifier.

Reference Books:

1) Electronics fundamentals and applications—J. D. Ryder, 5th Ed.
2) Principle of electronics - V. K. Mehta (S Chand and co. 2004)

SAC00102013T
SUB/DSC/T/201/ Digital Electronics – II

Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives:

1. To introduce students to various advance concepts of digital electronics
2. To make them understand the concept of' flip-flops, counters, shift registers, memories, analogue to digital and digital to analogue converters.
3. To enable students to design and construct circuits based of various flip-flops, counters, shift memories, analogue to digital and digital to analogue converters.

Course Outcomes (COs): After completion of course, students will be able to--

1. Apply the basic concepts of flip-flops, counters and shift registers to solve the complex problems in electronic circuits
2. Analyze various flip-flops, counters and shift registers, memories to identify various issues in digital networking
3. Design various digital circuits using concept of' flip-flops, counters and shift registers.
4. Design and develop a cost effective digital devices based on flip-flops, counters and shift registers.

Unit I: **10 Hrs.**

Flip-Flop: Flip flops (SR, D, JK and T) [using gates], Methods of triggering flip flops, Edge triggered flip flops (SR, D, JK and T), Asynchronous inputs, Master slave JK flip flop, Operating characteristics.

Unit II: **10 Hrs.**

Counters: Concept of counter, Asynchronous Counters (three and four bit), Synchronous Counters (three and four bit), decade Counter (asynchronous), Up/Down Synchronous Counter (three bit only).

Unit III: **10 Hrs.**

Shift Registers: Shift functions, Serial In Serial Out shift Register, Serial In Parallel Out Shift Register, Parallel In Serial Out Shift Registers Parallel, In Parallel Out Shift Register, Bidirectional S Register, Ring Counter, Buffer Register.

Reference Books:

I. Digital Fundamentals — Thomas L Floyd. Universal Book Stall New Delhi
2. Digital Electronics and Microcomputers R K Gaur
3. Digital Analog Techniques — Navneeth, Kale and Gokhale, Kitab Mahal
4. Digital Electronics with Practical Approach G N Shinde, Shivani Publication Nanded
5. Digital Principles and Circuits — C B Agarwal, Himalaya Publishing House

SAC00102263P
SUB/DSC/P/226 Amplifiers (Practical)

Total Credits: 02

Total Contact Hours: 60 Hrs **Maximum Marks: 50**

Minimum of Six Experiments to be perform excluding demonstration experiments.

Every candidate appearing for the examination must produce a journal showing that he/ she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

Experiments:

1. Built and study CE amplifier, plot the frequency response curve and find 3 dB bandwidth
2. Built and study common source FET amplifier. plot the frequency response curve and find 3 dB bandwidth
3. Built and study current series feedback amplifier, plot frequency response curve with and without feedback
4. Built and study two stage RC coupled CE amplifier, plot the frequency response curve and find 3 dB bandwidth.
5. Built and study common source amplifier.
6. Built and study CB amplifier, plot the frequency response curve and find 3 dB bandwidth.
7. Built and study emitter follower circuit, plot the frequency response curve.
8. Built and study Feedback Amplifier.
9. Calculate h parameter of transistor in CE configuration.

SAC00102273P
SUB/DSC/P/227 Digital Electronics-II (Practical)

Total Credits: 02

Total Contact Hours: 60 Hrs **Maximum Marks: 50**

Minimum of Six Experiments to be perform excluding demonstration experiments

Every candidate appearing for the examination must produce a journal showing that he/ she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

Experiments:

1. Built and study JK, T and D- Flip-Flops using IC 7476.
2. Built and study 4-bit binary parallel adder or using IC 7483.
3. Built and study 4-bit binary subtract or using IC 7483.
4. Built and study Synchronous (three or four bit).
5. Built and study Asynchronous Counters (three or four bit).
6. Built Serial In Serial Out shift Register.
7. Built Serial In Parallel Out Shift Register / Parallel In Serial Out Shift Registers.
8. Built Parallel In Parallel Out shift Register.
9. Built and study MOD 16 Asynchronous binary UP/ Down counter.
10. Built and study binary decade counter IC 7490.

SCC00102003T
SUB/Mn/T/200 Power Supplies
(This course is designed for the students from other discipline)
Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives :

1. Understand the basics: Define what a power supply is, its types, and applications.
2. Explain power supply fundamentals: Describe the principles of power conversion, including AC-DC, DC-DC, and DC-AC conversion.
3. Familiarize with power supply components: Identify and explain the functions of various power supply components, such as transformers, diodes, capacitors, and inductors.
4. Understand linear power supplies: Explain the operation, advantages, and disadvantages of linear power supplies.

Course Outcome (COs): After completion of course, students will be able to--

1. Understand power supply fundamentals: Explain the principles of power conversion, including AC-DC, DC-DC, and DC-AC conversion.
2. Identify power supply types: Describe the different types of power supplies, including linear, switching, and resonant power supplies.
3. Explain power supply components: Identify and explain the functions of various power supply components, such as transformers, diodes, capacitors, and inductors.
4. Understand power supply design: Explain the design considerations for power supplies, including efficiency, regulation, and stability.

Unit I: **10 Hrs.**

Basics of power supplies

Introduction, DC voltage ripple regulation, electronic power supply. Cells and batteries primary or secondary, Battery design, lead acid batteries, lithium cells, Ni-MH, mobile phone batteries, batteries for UPS, batteries for emergency power, precautions, testing of batteries, solar cell.

Unit II: **10 Hrs.**

Rectifier and Filters

Rectifiers, selenium rectifiers, silicon rectifiers, schottky diodes, Introduction Types of capacitors, capacitor connections, charging of a capacitor, discharging of capacitor, energy stored in capacitor, capacitor in electronics, inductors, filter action, effect of adding a capacitor, types of filters choke input filters, capacitor input filters, two stage filtering negative lead filtering, RF bypass.

Unit III: **10 Hrs.**

Power supply protection

Switches, switch ratings, arcing in switches, contact protection, connectors, Fuses, slow blow and fast blow Fuses, Fuse Mountings, Circuit Breakers, Protection against Power supply failures, Regulated and Unregulated Power Supplies, Transient Problems, Diode in Series, Diode in Parallel, Rectifier circuits, rectifier protection, voltage regulation, bleeder resistor, Ripple voltage and frequency, input versus output voltage, dual voltage power supply, voltage multipliers,

Reference Books:

1. Practical Electronic Power Supplies M. C. Sharma BPB Publication
2. Principal of Electronics V. K. Mehta S. Chand Publication

SCC00102013T

SUB/Mn/T/201: Consumer Electronics-I

(This course is designed for the students from other discipline)

Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives: In this paper Student will learn basic concepts of sensors, transducers, oscillators, speakers and modern TV.

Course Outcomes (COs): After completion of this course, students will able to.

1. Understand various sensors and their application.
2. Understand various Parts and their functions of microphone, speakers.
3. Understand working of Amplifier, mp3 players:
4. Understand working of TV.
5. Apply basic principles of electronics for repairing electronics devices

Unit I: **10 Hrs.**

Sensor and Transducer: Definition, Active and passive sensors, specifications, Types-Temperature, pressure, pH, humidity, optical, displacement, IR, tilt sensor etc. **Amplifiers & Oscillators:** Amplifiers: History, Principle, Types: Power amplifier, operational amplifier, distributed amplifier. Application. Oscillators: Construction & working, Basic types of oscillators.

Unit II: **10 Hrs.**

Speakers & Car mp3 players: Speakers: Introduction, History, Drive design, Driver types: Full range driver, Woofer, Tweeter, specification, electrical characterization, Car mp3 players: Various types of m/c, Various Audio systems e.g. 2.1ch, 5.1 etc, Standard specification of Audio system, mp3 players used in cars.

Unit III: **10 Hrs.**

TV System: Colour TV Block diagram, various sections of colour TV-viz -vertical section, various type of Monitor, Various new types (except CRT type) of TV's-plasma, LCD, LED, OLED, QLED, Curved, foldable, 3D, Smart TV.

References:

1. Monochrome and Colour Television: R R Gulati.
2. Audels Home appliances servicing – Edwin P. Anderson
3. Micro Electronic Circuit, Oxford University Press VIth Edition –Sedra & Smith
4. Basic electronics – By V. K. Mehate
5. Electronic Devices and Circuits McGraw Hill Millman, Halkias and Jit
6. Electronic Devices & Circuit Pearson Education – Boylestad & Nashelsky

SDC00102003T

SUB/ GE/OE /T/200: Maintenance of Air Conditioners.

(This course is designed for the students from other faculty)

Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives : The learning objective of studying Air conditioners includes basic concepts and principles in basic science and electronics.

1. Understanding the basic concept of heat conduction, convection and radiation and the basic principle of thermodynamics.
2. Understanding the basic principle of working of Air conditioners and knowledge of the testing procedure of components used in Air conditioners.
3. The concept and principle used in Air conditioners systems and their maintenance.

Course Outcomes (COs): After completion of the course, students will be able to:

1. Identify and comprehend the key principle of Air conditioners.
2. Evaluate and select appropriate components for Air conditioners.
3. Testing the performance of Air conditioners.
4. Locating the fault at the component level.

Unit I: **08 Hrs.**

Introduction to Air conditioners: Composition of air, Daltons law of partial pressure, Gas and Vapour mixture, Dry and Wet bulb temperature, Wet bulb depression, Dew point, Dew point depression, Saturated air.

Unit II: **10 Hrs.**

Psychrometry: Specific humidity, Degree of saturation, Relative humidity, Absolute humidity, Humid Specific. volume and humid specific heat, Enthalpy of moist air, Use of psychometric charts and tables, Sensible heating and cooling.

Unit III: **12 Hrs.**

Types and Installation of Room Air-Conditioner: Brief idea of various types of heat loads, Sensible and latent heat loads. Brief idea of room air conditioning, Window types packaged air conditioner. Central air conditioning system, Round the year air conditioning. Applications of Air conditioning. Installation of Room Air-Conditioner: Selection of proper location, providing proper slope and provision for to drain water, Ventilation arrangement for window air conditioner, wiring diagram for installation for room air, conditioner, Installation of split air conditioner.

Reference Books:

1. Refrigeration and Air Conditioning, Arora C. P., Tata McGraw-Hill
2. Refrigeration and Air Conditioning, Manohar Prasad, Willey Eastern Ltd, 1983
3. Refrigeration and Air Conditioning, Arora and Domkundwar, Dhanpatrai; Company, New Delhi

SEC00102003T

SUB/VSC/T/200: Electrical Wiring-I

Total Credits: 01

Total Contact Hours: 15 Hrs **Maximum Marks: 50**

Learning Objectives : The learning objective of studying electrical wiring basic concepts and principles in basic domestic wiring.

1. Understanding the basic concept of Safety precautions and shock treatment and how to handing Electrical Tools.
2. Understanding the basic principle, working of testing and installation of domestic wiring.
3. Understanding the concept and use of various electrical tools and Earthing formats for electrical connections.

Course Outcomes (COs): After completion of the course, students will be able to:

1. Identify and comprehend the key principal of electrical wiring.
2. Evaluate and select appropriate electrical wiring components.
3. Testing the performance of common and domestic electrical wiring.
4. Locating the fault at the electrical wiring level.

Unit –I: **05 Hrs**

Safety precautions and shock treatment: Workplace Discipline, Electrical shocks and procedure for separating person form contact with live wire, First Aid different methods of artificial respiration, Electric fire, Fire extinguishers.

Unit II: **04 Hrs**

Electrical Tools: Pliers, combination, side cutting, round nose, long nose, Screw drivers, connectors, electrical knife, neon tester, test lamp.

Unit III: **06 Hrs**

Common electric wiring and Domestic (House) Wiring: DC Circuits, Series circuit, Parallel circuit, Ohm's law, Kirchhoff's current and voltage law. Printed circuit board, introduction, types and testing. Types of wires, lamp holders, distribution wire. Introduction of Domestic wiring, selection of wiring, types of wiring, rules of domestic wiring, testing and installation of domestic wiring, Earthing formats for electrical connections.

Reference Books:

1. Electrical Wiring Estimating & Costing. - S. L. Uppal.
2. Electrical Wring Estimating & Costing. - J. D. Gupta.
3. Indian Electricity Rules. - Nausheer Bharocha.
4. Basic Electrical Engineering. - PHI. – S. N. Singh.

SEC00102013T

SUB/VSC/T/201: Digital Inverter-I

Total Credits: 01

Total Contact Hours: 15 Hrs **Maximum Marks: 50**

Learning Objectives :

1. To understand the basic function and purpose of an inverter.
2. Learn about different types of inverters.
3. Learn about relays and construction of relays.
4. Acquire knowledge about the types of transformers and its applications.
5. Understand how an inverter converts DC power to AC power.

Course Outcomes (COs): After completion of the course, students will be able to -

1. Explain the basic principles of digital inverters, including their operation, types, and applications. Identify the key components of digital inverters, including the power electronic switches.
2. The different types of single/three phase inverter circuits.
3. Explain the basic principles of relays, including their operation, types, and applications.
4. Identify the key components of transformers, including the primary and secondary windings, core, and insulation.

Unit I: **05 Hrs.**

Inverter: Introduction, inverter and UPS, basic working principle of the inverter, important component of the inverter, switching transistor and MOSFET, Bipolar transistor versus the MOSFETs, comparator.

Unit II: **05 Hrs.**

Relays: Introduction, History and development of relays, Applications of relays in various fields, Relay circuit symbols and notation, Solenoids, relay construction of relay, relays in circuit, single double and triple pole relays.

Unit III: **05 Hrs.**

Transformer: Introduction, voltage transformer, current transformation, impedance transformation, types of transformer output voltage, core, different types of winding in transformer, rating of transformer, applying DC to transformer, advantages of transformer.

Reference Books:

1. Modern Digital Inverter Manahar Lotia, Pradeep Nair: BPB Publica
2. Electical Technology II B.L. Thereja S. Chand Publication

SEC00102263P

SUB/VSC/P/226: Electrical Wiring-I

(Practical based on Electrical Wiring-I)

Total Credits: 01

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Minimum of Six Experiments to be perform excluding demonstration experiments

Every candidate appearing for the examination must produce a journal showing that he/ she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

Experiments:

1. Study of Safety precautions while working on electrical installations & necessity of earthing (Grounding).
2. Personal protection, basic injury prevention, symbol & sign for danger, warning & caution and elementary first aid.
3. Artificial respiration techniques of separating person in contact with & live wire
4. Demonstration of use of Fire Extinguishers
5. Demonstration and use of electrical tools.
6. Demonstration of different types of wires.
7. Study of Series circuit, Parallel circuit and Ohm's law.
8. Study of Kirchhoff's current and voltage law.
9. Design and testing of Switch Board.
10. Study of Domestic Electrical Wiring.

SEC00102273P

SUB/VSC/P/227: Digital Inverter-I

(Practical based on Digital Inverter-I)

Total Credits: 01

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Minimum of Six Experiments to be perform excluding demonstration experiments

Every candidate appearing for the examination must produce a journal showing that he/ she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

Experiments:

1. To study of single phase Uncontrolled / Controlled Inverter.
2. To study of three phase Uncontrolled / Controlled Inverter.
3. Design and implement a digital inverter using transistors (MOSFET).
4. To Investigate the Effect of Input Voltage on the Output of a Digital Inverter.
5. To Study the Working of a Relay-based Digital Inverter.
6. Study the Power Consumption of a Digital Inverter.
7. To Study the Working of a Transformer-coupled Digital Inverter.

BSc Second Year: 4th Semester

Course Type	Course Code	Examination Code (To be given by respective BoS)	Course Name	Teaching Scheme (Hrs / Week)		Credits Assigned		Total Credits
				Theory	Practical	Theory	Practical	
Major (Core) Mandatory DSC	SUB/DSC/T/ 250	SAC0010250 4T	Liner Integrated Circuits	2		2		2+2+2+2 = 08
	SUB/DSC/T/ 251	SAC0010251 4T	8086 Microprocessor	2		2		
	SUB/DSC/P/ 276	SAC00102764P	Practical based on SUB/DSC/T/ 250		4		2	
	SUB/DSC/P/ 277	SAC0010277 4P	Practical based on SUB/DSC/T/ 251		4		2	
Minor (Choose any two from pool of courses) **It is from different discipline of the same faculty**	SUB/Mn/T/ 250	SCC00102504 T	To be chosen from other discipline of same faculty	2		2		2+2 = 04
	SUB/Mn/T/ 251	SCC0010251 4T	To be chosen from other discipline of same faculty	2		2		
Generic / Open Elective (GE/OE) (Choose any one from pool of courses) **It should be chosen compulsorily from the faculty other than that of Major**	SUB/GE/OE/ T/250	SDC001025	To be chosen from other faculty	2		2		02
SEC (Skill Enhancement Courses) (Choose any one from SUB/SEC/T/ 250 and SUB/SEC/T/ 251) and corresponding	SUB/SEC/T/ 250	SEC001025 04T	Fundamental of Instrumentation	1		1		1+1 =02
	SUB/SEC/T/ 251	SEC001025 14T	Digital Inverter - II	1		1		
Practicals	SUB/SEC/P/ 276	SEC001027 64P	Practicals based on SUB/SEC/T/ 250		2		1	
	SUB/SEC/P/ 277	SEC001027 74P	Practicals based on SUB/SEC/T/ 251		2		1	
AEC, VEC, IKS	SUB/AEC/T/ 250		Modern Indian Language (MIL-2) (Choose any one from pool of language courses)	2		2		02
OJT/ FP/CEP/CC/RP	SUB/FP/P/ 276		Field Project		4		2	2+2= 04
	SUB/CC/P/ 277		(Fine/ Applied/ Visual/ Performing Arts) (Common for all the faculty)		4		2	
				13	18	13	09	22
Exit Option : Award of UG Diploma in major and minor with 88 credits and an additional 4 credits NSQF course (related to major / minor) / Internship during summer vacation OR Continue with Major and Minor								

Minor Courses for other Discipline

SUB/Mn/T/ 250 : This is a 2 credit theory course designed for other discipline **(Digital Electronics)**
SUB/Mn/T/ 251: This is a 2 credit theory course designed for other discipline **(Public Telephone Network)**

Generic /Open Elective Courses for other faculty

SUB/GE/OE/T/250 : This is a 2 credit theory course designed for other faculty **(Maintenance of Refrigeration)**

SAC00102504T

SUB/DSC/T/250: Linear Integrated Circuit.
Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objective:

1. To understand the basic concepts of operational amplifier and its various applications.
2. To understand the basics of oscillators and its practical applications.
3. To study IC 555 timer and its use in different applications.
4. Identify and explain the functions of various LIC components such as op amps and timers
5. Design and analyze active filter circuits using op amps, including firs order and second order filters

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand and analyze the IC 741 operational amplifier and its characteristics.
2. Design the solution for linear & non-linear applications using IC741.
3. Apply linear integrated circuits in various electronic system, including audio amplifiers, power supplies, and signal processing system
4. Explain the principles of oscillation and design various oscillator circuits.
5. Understand and analyze the IC 555 and its use in various applications.

Unit -I: **10 Hrs.**

Operational Amplifier

Differential amplifier-Dual input balanced output differential amplifier, block diagram of typical Op-Amp, schematic symbol, the ideal Op-Amp, equivalent circuit of an Op-Amp, Op-Amp Parameters-Input-Impedance, Output impedance, input offset voltage, Open Loop Voltage gain, input bias current, slew rate.

Unit -II: **10 Hrs.**

Operational Amplifier Applications

Voltage series feedback amplifier, Voltage shunt feedback amplifier, virtual ground, error voltage, gain of op-amp, Op-amp as inverting and non-inverting amplifier, buffer amplifier, adder, subtractor, integrator, differentiator, basic comparator, Schmitt trigger.

Unit -III: **10 Hrs.**

Oscillators and The 555 Timer

Oscillator principle, types of oscillations, frequency stability, phase shift oscillator, Wien Bridge oscillator, square wave generator, triangular wave generator, saw tooth wave generator, voltage controlled oscillator. Introduction, Basic block of IC 555 timer and function of each block, IC 555 as monostable multivibrator, and applications, IC 555 as an astable multivibrator, applications, Free running ramp generator.

Reference Books:

1. Op-Amps & Linear Integrated Circuits (Second Edition) [Chapters 1 to 4], Ramakant Gaikwad, Prentice Hall of India.
2. Electronics Principles and Applications (Fifth edition) [Chapters 1and 2.], John D Ryder
3. Linear Integrated Circuits D Roy Choudhry &Shail B Jain, New Age International Publishing
4. Electronic Devices (Sixth Edition) Floyd, Pearson Education
5. Op Amps & Linear Integrated Circuits James M Fiore, Thomson Learning
6. Integrated Circuits, K R Botkar, Khanna Publishers, New Delhi.

SAC00102514T
SUB/DSC/T/251: 8086 Microprocessor
Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objective:

1. Understand outline the history of microprocessor.
2. Identify and explain the function of various 8086 components, such as ALU, Registers and Buses
3. Describe the architecture of 8086 microprocessors.
4. Understanding instruction set
5. Develop programs for microprocessor.

Course Outcomes (COs): After completion of this course, students will be able to -

1. Draw timing diagram and write programs using 8086
2. Distinguish between the different modules of operation of microprocessors.
3. Evaluate the appropriateness of a memory expansion interface based on the address reference with particular application.
4. Apply the above concepts to real world electrical and electronics problems and applications.
5. Communicate technical information related to the 8086 microprocessor effectively

Unit -I: **10 Hrs.**

The 8086 Microprocessor

Introduction to microprocessor, registered organization of 8086, features of 8086, architecture of 8086, Pin diagram (Signal Description), Physical Memory Organization, general bus operation, I / O addressing capability, special processor activities, minimum mode 8086 system and timing, maximum mode 8086 system and timing.

Unit -II: **10 Hrs.**

The 8086 Microprocessor Instruction set

Machine language instruction formats, addressing modes of 8086, Data copy / transfer instructions, Arithmetic instructions, logical instruction, Branch instructions, loop instructions, machine control instructions, Flag manipulation instructions, Shift and rotate instructions, String instructions

Unit -III: **10 Hrs.**

Assembly language programming

Assembly language programs- addition of two numbers, addition of a series of 8 bit numbers, find the largest number from given array of 8 bit numbers, find out odd and even numbers from the given series of hexadecimal numbers, find out positive numbers and negative numbers from a given series of signed numbers, move a string of data from one location to other location, arrange given array of 8 bit numbers in ascending order, arrange given array of 8 bit numbers in descending order, one byte BCD addition, **Stack and Interrupts:** Introduction to stack, stack structure of 8086, interrupt and interrupt service routines, interrupt cycle, non-maskable interrupt, maskable interrupt.

Reference Books:

1. Advanced Microprocessors and Peripherals (Second Edition) – A K Ray & K M Bhurchandi Tata McGraw Hill 2009
2. The INTEL Microprocessors 8086 /8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Processor –Barry B. Brey Printice-Hall INDIA
3. Microprocessors – S. K. Gupta Pragati Prakashan Meerut
4. Microprocessors – II –A. P. Godse Technical Publications PUNE

SAC00102764P
SUB/DSC/P/ 276: Linear Integrated Circuits
(Practical based on Linear Integrated Circuits)
Total Credits: 02

Total Contact Hours: 60 Hrs **Maximum Marks: 50**

Every candidate appearing for examination must produce journal showing that he/she has completed 06 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments:

1. Study of Op – Amp as a non-inverting amplifier.
2. Study of Op – Amp as an inverting amplifier.
3. Study of Op – Amp as an inverting adder.
4. Study of Op – Amp as an inverting subtractor.
5. Study of Op – Amp as an integrator.
6. Study of Op – Amp as a differentiator.
7. Study of Op – Amp as a Schmitt trigger.
8. Study of Op – Amp as an analogue computer to solve simple equation.
9. Study of Op – Amp as Low voltage DC voltmeter
10. Built and study Wien Bridge oscillator using Op – Amp.
11. Built and study phase shift oscillator using Op – Amp.

SAC00102774P

Course Code: SUB/DSC/P/ 277: 8086 Microprocessor

(Practical based on 8086 Microprocessor)

Total Credits: 02

Total Contact Hours: 60 Hrs **Maximum Marks: 50**

Every candidate appearing for examination must produce journal showing that he/she has completed 06 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments:

1. Assembly language program to find sum of 8 bit or 16 bit numbers.
2. Assembly language program to find sum of 8 bit numbers in a given array.
3. Assembly language program to find out positive numbers and negative numbers from a given series of signed numbers.
4. Assembly language program to find a factorial of given number.
5. Assembly language program to transfer the data of two register not using third register.
6. Assembly language program to find average of block of data containing N numbers.
7. Assembly language program to determine whether the number is even or odd. If the Number is odd, copy 00 to ML ---- otherwise copy EE.
8. Assembly language program to move a string of data from one location to other location.
9. Assembly language program to perform one byte BCD addition.
10. Assembly language program to arrange given array of 8 bit elements in ascending order / descending order.

SCC00102504T
Course: Minor
SUB/Mn/T/250: Digital Electronics
(This course is designed for the students from other discipline)
Total Credits: 02

Total Credits: 02 **Total Contact Hours: 30 Hrs**

Maximum Marks: 50

Learning Objectives of the Course:

1. To introduce students to various fundamental concepts of digital electronics.
2. To make them understand the concept of number system, logic gates and combinational logic circuits.
3. To enable students to design and construct circuits based on various logic gates and combinational logic circuits.

Course Outcomes (COs):

After completion of course, students will be able to--

1. Apply the basic concepts of number system logic gates and combinational logic circuits to solve the complex problem in electronics circuits.
2. Analyze various logic gates and combinational logic circuits to identify various issues in digital networking.
3. Design various digital circuits using logical gates and combinational logic circuits.
4. Design and develop a cost effective digital devices based on adder and subtractor.

Unit-I: **10 Hrs.**

Number System: Decimal, Binary, Octal and Hexadecimal number and their conversions, Binary arithmetic; addition, subtraction, Multiplication and division, 1's and 2's complement method for binary subtraction, Gray code, Excess-3 addition.

Unit II: **10 Hrs.**

Logic gates and Boolean algebra: Positive and negative logic gates (AND, OR, NOT, NAND, NOR) using diode & transistor, Ex-OR and Ex-NOR gate. **Boolean algebra:** Boolean laws, De-Morgan's Theorem, SOP and POS form of Boolean expression. Simplification of Boolean Expression, Karnaugh Map (K-map up to four variables only).

Unit III: **10 Hrs**

Combinational logic circuits: NAND and NOR gates Universal building blocks, Half adder, Full adder, Half subtractor, Full subtractor, 4-bit parallel adder and subtractor, 2's complement adder / subtractor.

Reference Books:

1) Digital Fundamentals – Thomas L. Floyd, Universal Book Stall New Delhi.
2) Digital Electronics and Microcomputer -R. K. Gaur.
3) Digital Analog Techniques – Navanath, Kale and Gokhale, Kitab Mahal.
4) Digital Electronics with Practical Approach – G N Shinde, Shivani Publications Nanded.
5) Digital Principal and Circuits – C. B. Agarwal, Himalaya Publishing House.

SCC00102514T
Course: Minor
SUB/Mn/T/251: Public Telephone Network
Total Credits: 02

(This course is designed for the students from other discipline)

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives:

1. Define communications and telecommunications.
2. Describe the operation and basic functions of a standard telephone set.
3. Explain the relationship among telephone set, local loops, and central office switching machines.
4. Describe basic telephone call procedure.

Course Outcomes: On Completion of this course the students will be able to:

1. Learn the operation and basic functions of a standard telephone set.
2. Learn telephone circuit, message, and message channel.
3. Able to learn the block diagram of a telephone set.

UNIT-I: **10 Hrs**

Telephone Instruments and signals: Introduction, The subscriber loop, Standard telephone set, Block diagram of a telephone set, Basic telephone call, procedures, Call progress tones and signals, Cordless telephones, Caller ID, Electronic telephones, Paging systems.

UNIT-II: **10Hrs**

Telephone circuit: Introduction, The local subscriber loop, Telephone message-channel noise and noise weighting, Units of power measurement, Transmission parameters and private-line circuits, Voice-frequency circuit arrangements, crosstalk.

UNIT-III: **10 Hrs**

The public telephone network: Introduction, Telephone transmission system environment, The public telephone network, Instruments, local loops, trunk circuits, and exchanges, Local central office telephone exchanges, Operator-assisted local exchanges, Automated central office switches and exchanges, Telephone service, Cellular telephone concepts, Mobile telephone service, Evolution of cellular telephone, Cellular telephone network components, Cellular telephone call processing.

Reference Books:

1: Advanced Electronic Communications Systems by Wayne Tomasi, Sixth Edition.

SDC00102504T

SUB/ GE/OE /T/250: Maintenance of Refrigeration.

(This course is designed for the students from other faculty)

Total Credits: 02

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Learning Objectives: The learning objective of studying refrigeration includes basic concepts and principles in basic science and electronics.

1. Understanding the basic concept of heat conduction, convection and radiation and the basic principle of thermodynamics.
2. Understanding the basic principle of working of refrigeration and knowledge of the testing procedure of components used in refrigeration.
3. The concept and principle used in refrigeration systems and their maintenance.

Course Outcomes (COs): After completion of the course, students will be able to:

1. Identify and comprehend the key principle of refrigeration.
2. Evaluate and select appropriate components for refrigeration.
3. Testing the performance of refrigeration.
4. Locating the fault at the component level

UNIT-I: **10 Hrs**

Basic Thermodynamic: Definition, concept of thermodynamic system and surroundings, closed system, open system, isolated system thermodynamics, definition of work, Zeroth law of thermodynamics, First law of thermodynamics for cyclic and noncyclical processes, Applicability of first law on various thermodynamics processes.

UNIT-II: **10 Hrs**

Introduction refrigeration: meaning and application of refrigeration, a block diagram of refrigeration unit (Evaporator, Condenser, Compressor) Domestic refrigerator, concept of cold chain, Various methods of refrigeration.

UNIT-III: **10 Hrs**

Refrigeration Systems: Refrigeration Cycles: Refrigeration, Carnot cycle of refrigeration (ideal cycle), Bell-Coleman cycle of refrigeration, their Coefficient of performance (COP) and Conditions for its highest value, Temperature limitations. VAPOUR COMPRESSION SYSTEM: Standard vapour compression cycle, wet and dry compression, Effect of sub cooling and superheating, Effect of temperature and pressure on COP of the cycle. Concept of household refrigerator working on vapour compression cycle.

Reference Books:

1. Refrigeration and Air Conditioning by Manohar Prasad, New Age International (P) Limited, New Delhi
2. Course in Refrigeration and Air Conditioning by S.C. Arora and S. Domkundwar, Dhanpatrai and sons, Delhi
3. Refrigeration and Air Conditioning by C.P. Arora, McGraw Hill Education (India) (P) Limited, New Delhi
4. Principles of Refrigeration by Roy J. Dossat, Pearson Education, New Delhi
5. Handbook of Air conditioning and refrigeration by Shan K Wang, McGraw-hill international edition, Singapore.

SEC00102504T

SUB/ SEC//T/250: Fundamental of Instrumentation

Total Credits: 01

Total Contact Hours: 15 Hrs **Maximum Marks: 50**

Learning Objectives:

1. Understand the working principle, construction, and uses of different domestic electrical appliances such as pH meter, Digital Balance, Clamp meter, Dimmer stat, Colorimeter, Laser source, Sodium & Mercury source, Lab/Industrial Trainer Kit, IR lamp.
2. Acquire skills of testing and repairing electrical appliances.

Course Outcomes (COs): After completion of the course, students will be able to -

1. Explain the basic principles of pH meter, Digital Balance, Clamp meter, Dimmer stat including their operation, and applications.
2. Identify or to know the various parts pH meter, Digital Balance, Clamp meter, Dimmer stat .
3. Explain the basic specification application, of Colorimeter, Laser source, Sodium, IR lamp.
4. Maintenance and troubleshooting of various lab instruments was discussed.

UNIT-I: **05 Hrs**

pH meter: Principle, working, various parts, types, specification, maintenance and trouble shooting, Application, **Digital Balance:** Principle, working, various parts, types, specification, maintenance and trouble shooting. Application. **Clamp meter:** Principle, working, various parts, types, specification, maintenance and trouble shooting. Application.

UNIT-II: **05 Hrs**

Dimmerstat: Principle, working, types, specification, maintenance and trouble shooting. Application.

Colorimeter: Principle, working, various parts, types, specification, maintenance and trouble shooting, Application.

UNIT-III: **05 Hrs**

Laser source, Sodium source, Mercury source: Principle, working, various parts, types, specification, maintenance and trouble shooting, Application. **Lab Industrial Trainer Kit:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application. **IR lamp:** Principle, working, various parts, types, specification, maintenance and trouble shooting, Application

References:

1. Fundamentals of Electrical engineering by Ashfaq Husain,
2. A Textbook of Electrical Technology by B.L. Thereja.
3. Electrical Science by J. B. Gupta

SEC00102514T
SUB/SEC/T/251: Digital Inverter-II

Total Credits: 01

Total Contact Hours: 15 Hrs **Maximum Marks: 50**

Learning Objectives:

1. To understand the basic concept and types of battery.
2. Learn about different types of chargers.
3. Acquire knowledge about the increase battery life, detect the completion of charging.
4. Understand PWM technology and MOSFET.

Course Outcomes (COs): After completion of the course, students will be able to -

5. Explain the basic principles of rechargeable batteries, including their operation, types, and applications.
6. Identify the key components of rechargeable batteries, including the positive electrode, negative electrode, electrolyte, and separator.
7. Explain the basic principles of battery chargers, including their operation, types, and applications.
8. Discuss the importance of charging algorithms, charging modes and safety features in determining the performance and safety of battery chargers.
9. Recognize the concept of integrated Circuits (ICs) in the inverter.

UNIT-I: **05 Hrs**

Rechargeable battery: Introduction, Definition and types of rechargeable batteries, Primary battery, secondary battery, History and development of rechargeable batteries, Cells and batteries rechargeable battery, Electrochemical principles of rechargeable batteries, wet lead acid battery, dry lead acid battery or maintenance free battery.

UNIT-II: **05 Hrs**

Battery charger: Introduction of battery charger, types of battery charger, Battery charging methods (e.g. constant current, constant voltage, pulse charging), Battery charging characteristics (e.g. charge/discharge cycles, depth of discharge), how to detect when the battery is fully charge, trickle charging, points to increase battery life, Battery charging safety considerations.

UNIT-III: **05 Hrs**

Integrated Circuits (ICs) in the inverter: The basic principle of ICs, Definition and types of ICs used in inverters, PWM based 500 VA/625 VA-12 volt MOSFET inverter, PWM technology, Applications of MOSFET.

Reference Books:

1. Modern Digital Inverter Manahar Lotia, Pradeep Nair: BPB Publica
2. Electrical Technology II B.L. Thereja S. Chand Publication

SEC00102764P

SUB/SEC/P/ 276: Practical based on Fundamental of Instrumentation

Total Credits: 01

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Every candidate appearing for examination must produce journal showing that he/she has completed 06 experiments during the semester. The journal must be certified at the end of the semester by The Head of the Department.

Experiments:

1. Calibration and use of pH meter.
2. Calibration and use of Digital Balance.
3. Calibration and use of Clamp meter.
4. Calibration and use of Dimmer-stat.
5. Calibration and use of Colorimeter.
6. Calibration and use of Laser source.
7. Calibration and use of Sodium & Mercury source.
8. Calibration and use of Lab/Industrial Trainer Kit.
9. Calibration and use of IR lamp.
10. Calibration and use of Incubator.

SEC00102774P

SUB/SEC/P/277: Practical based on Digital Inverter-II

Total Credits: 01

Total Contact Hours: 30 Hrs **Maximum Marks: 50**

Minimum of Six Experiments to be perform excluding demonstration experiments

Every candidate appearing for the examination must produce a journal showing that he/ she has completed 06 experiments during the academic year. The journal must be certified at the end of the semester / year by Head of the Department.

Experiments:

1. To Study the Charging and Discharging Characteristics of a Rechargeable Battery.
2. To Study the Self-Discharge Characteristics of a Rechargeable Battery.
3. To Study the Working of a Simple Battery Charger.
4. To Investigate the Effect of Input Voltage on the Output of a Battery Charger.
5. To Study the Working of a 7404 Hex Inverter IC in a Digital Inverter
6. To Study the Working of a MOSFET-based Digital Inverter.
7. To Investigate the Effect of Gate Voltage on the Output of a MOSFET-based Digital Inverter.
8. To study of PWM Inverter.