P.D.E.A's.
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Syllabus Framework and Design of Electronics for

B. Sc. (Comp. Sci.) and B.C.A. (Sci.) under Autonomy and NEP-2023

Sem.	Major Elective Courses	Minor Courses	VSC	GE/OE
First Year Certificate Course				
I		-	To B.Sc. (Comp. Sci.) 1 Theory From Electronics	2 Theory From Electronics in Basket
II		1 Theory From Electronics		2 Theory From Electronics In Basket
Second Year Graduate Diploma				
III		1 Theory + 1 Practical From Electronics		1 Practical From Electronics In Basket
IV		1 Theory + 1 Practical From Electronics	-	1 Practical From Electronics In Basket
Third Year Graduate Degree				
V	To B.Sc. (Comp. Sci.) 1 Theory + 1 Practical From Electronics	1 Theory + 1 Practical From Electronics		-
VII	To B.Sc. (Comp. Sci.) 1 Theory + 1 Practical From Electronics	1 Theory + 1 Practical From Electronics	-	-

Course Codes for various courses

Sem.	Major Elective Courses	Minor Courses	VSC	GE/OE
First Year Certificate Course				
I	-	-	CSVST-111	ELCOET-111 ELCOET-112
II	-	ELCMIT-121	-	ELCOET-121 ELCOET-122
Second Year Graduate Diploma				
III	-	ELCMIT-231 ELCMIP-232	-	ELCOEP-231
IV	-	ELCMIT-241 ELCMIP-242	-	ELCOEP-241
Third Year Graduate Degree				
V	CSMAET-351 CSMAEP-352	ELCMIT-351 ELCMIP-352	-	-
VII	CSMAET-361 CSMAEP-362	ELCMIT-361 ELCMIP-362	-	-

Syllabus Framework and Design of Electronics for B. Sc. (Comp. Sci.) and B.C.A. (Sci.) under Autonomy and NEP-2023

Courses Codes, Generic name and Title of the paper of Electronics

Sem	Course code	Generic name	Title	Credits
I	CSVST-111	Vocational Skill Theory	Computer Architecture and Organization	2
Electronics				
I	-------	--------	---------	
II	ELCMIT-121	Minor ElectronicsTheory-1	Fundamentals of Analogue and digital electronics	2
III	ELCMIT-231	Minor ElectronicsTheory-2	Analogue and digital Systems	2
	ELCMIP-232	Minor ElectronicsPractical-1	Electronics practical Lab1	2
IV	ELCMIT-241	Minor ElectronicsTheory-3	Computer Instrumentation	2
	ELCMIP-242	Minor ElectronicsPractical-2	Electronics practical Lab2	2
V	ELCMIT-351	Minor ElectronicsTheory-4	Principals of Communication Systems	2
	ELCMIP-352	Minor ElectronicsPractical-3	Electronics practical Lab3	2
VI	ELCMIT-361	Minor ElectronicsTheory-5	Microcontroller and embedded systems	2
	ELCMIP-362	Minor Electronics Practical-4	Electronics practical Lab4	2

Major Elective				
V	CSMAET-351	Elective Electronics for Computers Science	Internet of Things	2
	CSMAEP-352	Elective Electronics Practical paper for Computers Science	Practical's on IoT	2
VI	CSMAET-361	Elective Electronics for Computers Science	Architecture and Programming of Raspberry Pi	2
	CSMAEP-362	Elective Electronics Practical paper for Computers Science	Practical's on Raspberry Pi	2

Semester II

Fundamentals of Analogue and Digital Electronics

Course code: ELCMIT-121 **No. of Credits: 2**

Unit No.	Unit Title and Contents
Module 1	
1	**Semiconductor Diodes (4)** Semiconductor, P and N type semiconductors, Formation of PN junction diode, it's working,ForwardandReversebiascharacteristics,Zenerdiode:workingprinciple,breakdownmechanism and characteristics, Working principle of Light emitting diode, photo diode, opto - coupler, Solar cell working principle and characteristics
2	**Bipolar Junction Transistor(BJT) (7)** Symbol, types, construction, working principle of BJT,Transistorconfigurations-CB,CC(onlyconcept),CEconfiguration:inputandoutputcharacteristics,ConceptofBiasing,Potential Dividerbias,Transistorasamplifier, Transistor as a switch, RC coupled single stage transistor amplifier, (Concept of Gain and Bandwidth expected),
3	**MOSFET (4)** FET and MOSFET: types, Working principle, Characteristics, Application of FET and MOSFET as a Switch.
Module 2	
I	**Number system and codes (5)** Decimal, binary, octal, hexadecimal number systems, Conversion of numbers from one number system to another including decimal / binary points, Binary addition, subtraction, multiplication, division, 1's and 2's complement method of subtraction BCD code numbers and their limitations, Concept of parity, Error detection using parity, ASCII code
2	**Logic gates and Boolean Algebra (10)** Introduction to analog signals and digital signals, Positive and Negative logic, Logic gates: definition, symbols, truth tables, Boolean expressions, pulsed operation of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates Rules and laws of Boolean algebra, logic expression, De Morgan's theorems, their proof, Sum of products form (min. terms), Product of sum form (max. terms), Simplification of Boolean expressions using Boolean algebra and Karnaugh map up to 4 variables. Conversion of Boolean equations into digital circuits
Text and Reference Books:	
1.	Malvino Electronics Principles By- Malvino A. P. Ed-6, McGraw Hill publication.
2.	Modern Digital Electronics By- Jain R.P. Ed-4, Pub- Tata McGraw Hill publication India
3.	Digital Fundamentals By FloydT.M.Ed-11,Pub-Person Education Publication.

Course Outcomes (COs): On completion of the course, the students will be able to:
CO1: Study and Explain construction details of various semiconductor devices.
CO2: Explain operation and characteristics behavior of various semiconductor devices.
CO3: Explain needs and operation details of elementary electronic circuits and systems.
CO4: Get familiar with concepts of digital electronics.
CO5: Learn number systems and their representation.
CO6: Understand basic logic gates, Boolean algebra.
CO7: Simplify and design simple digital systems using Boolean algebra and K-Map.

Semester III	
Analogue and Digital Systems	
Course code: ELCMIT-231	**No. of Credits: 2**

Unit No.	Unit title and Contents
Module 1	
I	**Combinational Circuits (5)** Half adder, Full adder circuit and its operation, Parallel binary adder, Half Subtractor, and full Subtractor Multiplexer(2:1 and 4:1), De-multiplexer (1:2 and 1:4), Encoder, Priority encoder, Decoder, BCD to seven segment decoder
2	**Sequential Circuits (8)** Difference between combinational and sequential circuits, the Concept of clock and types, synchronous and asynchronous circuits, Latch, S-R-latch, D-latch, S-R, J-K, and D flip-flop their operation and truth tables, race around condition, Master-slave JK flip flop, T flip flop (Timing diagram and truth tables). The basic building block of the counter, Ripple counter, up counter, down counter, Up- Down counter, Concept of modulus counters, Decade counter, Shift registers: SISO, SIPO, PISO, PIPO, Ring counter, Universal 4-bit shift register
3	**Semiconductor memory (5)** Memory Architecture, Memory parameters (Access time, speed, capacity, cost), Concept of Address Bus, Data Bus, Control Bus, Memory Hierarchy, Types of semiconductor Memories, Data Read/ Write process, Vertical and Horizontal Memory Expansion, Role of Cache memory,
Module 2	
1	**POWERSUPPLY (7)** Block Diagram of Regulated Power Supply, Rectifiers (half wave, wave, Bridge), rectifier with capacitor-filter, Use of Zener Diode as a Voltage Regulator, IC 78XX and 79XX as regulator, Block Diagram and explanation of SMPS, Block diagram and explanation of UPS
2	**OSCILLATORS (5)** Concept of Feedback, Bark hauson Criteria, Low frequency Phase shift oscillator, High frequency crystal oscillator, IC555 as Astable multivibrator used as square wave generator
Text and Reference Books:	
1.	Malvino Electronics Principles By- Malvino A. P. Ed-6, Pub-McGraw Hill publication.
2.	Digital Logic and Computer Design By -M. Morris Mano Ed-7 Pub-PHI Publication.
3.	Modern Digital Electronics By Jain R.P. Ed-4, Pub- Tata McGraw Hill publication India

Course Outcomes (COs): On completion of the course, the students will be able to:
CO1: Explain needs and operation details of elementary electronic circuits and systems such as power supplies and oscillators etc.
CO2: Study and design simple combinational circuits (constriction and operations) using digital techniques
CO3: Study and design simple sequential circuits (constriction and operations) using digital techniques.
CO4: Understand concept of Clock and timing diagram in sequential circuits used in digital systems.
CO4: Design and Explain working principles of various sequential circuits used in digital systems.
CO5: Understand and illustrate different types semiconductor memory.
CO6: Understand Memory organization, and need and methods of memory expansion.

Semester III	
Electronics practical Lab-1	
Course Code: ELCMIP-232	**Number of Credits : 02**

Sr. No.	Title of Experiment / Practical
Total 10 experiments are to be performed by student. Any five experiments from each group	
Group A	
1.	Study of different types of diodes (PN junction diode, LED, Photo diode)
2.	Study of rectifier (Half, Full and Bridge) circuits along with filters
3.	Study of Zener diode as Voltage regulator.
4.	Study of CE characteristics of Bipolar Junction Transistor
5.	Study of characteristics of JFET / MOSFET
6.	Study of transistor as a switch.
7.	Study of RC coupled transistor amplifier.
8.	Study of IC 555 as an Astable multivibrator.
9.	Study of Transistorized Phase shift Oscillator.
Group B	
1.	Study of different types of logic gates and verification of De-Morgan's laws.
2.	Interconversion of logic gates using NAND and NOR gates.
3.	Study of parity code generator and error detector.
4.	Study of Half adder and full adder
5.	Study of Multiplexer and De-multiplexer (4:1 MUX and 1:4 DEMUX)
6.	Study of SR and JK flip flops (T and D as modification)
7.	Study of 4-bit UP/DOWN counter.
8.	Study of Modulo counter using IC 7490. (Mod-2 , Mod-5 and Mod 10)
9.	Study of 4-bit Shift register.

Course Outcomes (COs): On completion of the course, the students will be able to:	
CO1	Describe the circuit diagrams using different symbols various components.
CO2	To design and connect experimental board circuit.
CO3	Discuss the working of circuits of individual experiments.
CO4	To acquire skills of studying and analyzing the responses of electronic circuits.
CO5	Analyze observations of each experiment based on the aim and objectives of an experiment.
CO6	Evaluate observed outputs with expected theoretical outputs.
CO7	Discuss the need and requirement of electronic equipment in daily life.
CO8	Reconstruct the given circuit to obtain an electronic gadget.

Semester IV	
Computer Instrumentation	
Course code: ELCMIT-241	**No. of Credits: 2**

Unit No.	Unit title and Contents
Module 1	
1	**Sensors and Transducers (6)** Introduction, Need and Definition of sensors and transducers, Classification of sensors: Active and passive sensors, Specifications of sensor: Accuracy, range, linearity, sensitivity, resolution, reproducibility, Temperature and Humidity sensors: Thermistor, LM-35, AD590 and DHT 11, Piezoelectric sensor, Optical sensor (LDR), Displacement sensor (LVDT), Passive Infrared sensor (PIR), Concept of Touch sensor and Ultrasonic sensor. (Pin diagrams, features and applications)
2	**Operational Amplifier (8)** Operational Amplifier: Block diagram, symbol, Characteristics of OP-AMP, Concept of virtual ground, Inverting and Non-inverting amplifier, OPAMP as an adder and subtractor, OP-AMP as an integrator and differentiator, Three OP-AMP instrumentation amplifier.
3	**Signal Conditioning Circuits (4)** Introduction and need of signal conditioning, voltage divider circuits, bridge circuits, filters, Sample and hold circuit.
Module 2	
1	**DATACONVERTERS (7)** Need of Data converters, Digital to Analog converters (DAC) and Analog to Digital converter, Parameters of DAC, Types of DACs: weighted resistive network and R-2R ladder network. Study of DAC IC-0808 (Block diagram, Parameters) Parameters of ADC, Types of ADCs: Flash ADC, successive approximation ADC. Dual slop ADC. Study of ADC IC-0809 (Block diagram, Parameters).
2	**Basics of Computer System (5)** Basic Computer Organization, CPU block diagram and explanation of each block, Concept of Stack & its organization, I/O organization: need of interface, block diagram of general I/O interface.
Text and Reference Books:	
1.	Malvino Electronics Principles By- Malvino A. P. Ed-6, McGraw Hill publication.
2.	Modern Digital Electronics by Jain R.P. Ed-4, Pub- Tata McGraw Hill publication India
3.	Digital Logic and Computer Design By -M. Morris Mano Ed-7 Pub PHI Publication
4.	Process control Instrumentation Technology By - C.D. Johnson Ed-8 Pub-Pearson Publication.

Course Outcomes (COs): On completion of the course, the students will be able to:
CO1: Define sensor and its parameters.
CO2: Classify Sensors and discuss the need for signal conditioning circuits.
CO3: Concept of Operational amplifier and its use in signal conditioning circuits.
CO4: Analyze different types of ADCs and DACs.
CO5: Compare the frequency response of different types of filters and discuss the need for selecting filters.
CO6: Understand different blocks needed to design digital computer system.
CO7: Understand and illustrate block diagram of central processing unit.
CO8: Understand I/O organization and need of interfacing with general I/O interface.

Semester IV	
Electronics practical Lab-2	
Course Code: ELCMIP-242	**Number of Credits : 02**

Sr. no.	Title of Experiment/ Practical
Total 10 experiments are to be performed by student. Any five experiments from each group	
Group A	
1	Study of LDR characteristics.
2	Study of Thermistor / AD-590 / DHT 11 / LM 35.
3	Study of LVDT as a displacement sensor.
4	Study of frequency response of active filter circuits(RC filters)
5	Study of Inverting and Non-inverting amplifier
6	Study of Adder and Subtractor using OP-Amp.
7	Study of Integrator and differentiator using OP-Amp.
8	Study of Sample and Hold circuit.(Using suitable IC e.g. IC1496)
9	Study of Switch Mode Power Supply (SMPS).(Using suitable IC e.g. IC 3524)
10	Study of Three OPAMP Instrumentation Amplifier
Group B	
1	Study of Crystal Oscillator using inverters.
2	Study of Universal 4-bit adder/Subtractor.
3	Study of RAM and read/write action of RAM (using suitable IC e.g. IC 7489).
4	Study of Diode matrix ROM and read action of ROM.
5	Study of Priority Encoder using IC 74148/74147.
6	Study of R-2R Digital to Analog Converter.
7	Study of 3-bit Flash Analog to Digital Converter.
8	Study of BCD to 7-segment Display
9	Study of Keyboard matrix encoder

Course Outcomes (COs): On completion of the course, the students will be able to:	
CO1	Identify different analog and digital electronic circuits.
CO2	Identify different sensors and analyze their response.
CO3	Recognize need of various circuit elements in analogue and digital systems.
CO4	To acquire skills of studying and analyzing the responses of electronic circuits.
CO5	Analyze observations of each experiment based on the aim and objectives of an experiment.
CO6	Evaluate observed outputs with expected theoretical outputs.
CO7	Discuss the need and requirement of electronic equipment in daily life.
CO8	Acquirers the skill of design and build his /her simple circuit ideas

T. Y. B. Sc. (C. S.) Semester V	
Principles of Microcontroller and Embedded Systems	
Course code: ELCMIT-351	**No. of Credits: 2**

Unit No.	Title and Contents
Module 1	
1	**Basics of Microcontroller & Intel 8051 architecture [8]** Introduction to microcontrollers, difference in microcontroller and microprocessor. **Architecture of 8051:** Internal block diagram of 8051: ALU, PC, DPTR, PSW, Latch, SFRs, General purpose registers, pin diagram and pin functions of 8051, I/O ports: Port0, Port1, Port2, and Port3. Structure, Operation and specifications of I/O Ports, **Memory organization:** Program and Data Memory Map, Internal RAM organization, Internal ROM. External Memory Interface. Stack, Stack Pointer and Stack operation.
2	**Programming model of 8051 [9]** **Instruction set:** Instruction classification, Data Transfer, Arithmetic, Logical, Branching, Machine Control, Stack operations and Boolean operations. **Addressing Modes:** Immediate, register, direct, indirect and relative, **Assembler directives:** ORG, DB, EQU, END, CODE, DATA. **Software development cycle:** editor, assembler, simulator, cross-compiler, linker, compiler. **8051 Assembly language programming and C programming:** arithmetic and logical programming, Looping, Counting, Time delay loop, Look-up table, Bit addressability, I/O Bit & Byte programming
Module 2	
3	**Serial communication [8]** **Timers & Counters:** Timers/Counters SFRs: TMOD, TCON logic diagram and its operation in various Timer modes: mode 0, mode 1 and mode 2. Programming for time delay **Interrupt:** Introduction to interrupt, Interrupt types Interrupt structure, SFRs - Interrupt enable register (IE) and interrupt priority register(IP). vector address, priority and operation. ISR – Interrupt Service Routine. **Serial Communication:** Definition, various modes Synchronous and asynchronous, baud rate for serial communication. Configuration, using SFRs - SCON, SBUFF, PCON Programming serial port without interrupt, Use of timer/counter Programming serial port with interrupt: Configuration of interrupts for serial communication,
4	**Applications of 8051 using Embedded 'C' [5]** **Interfacing Input Devices:** Pushbutton, thumb wheel switch ADC, LM35, rain sensor. **Interfacing Output Digital Devices:** LED, 7-segment LED display, LCD display, DC and Stepper motor, DAC.
Text and Reference Books:	
1. **2.**	8051 microcontroller and Embedded system using assembly and C:Mazidi, Mazidi and McKinley, Pearson pub. The 8051 microcontroller Architecture, programming and applications:K.Uma Rao and AndhePallavi, Pearson pub

Course Outcomes (COs): On completion of the course, the students will be able to:	
CO1:	**Demonstrate** the basic concepts of microcontrollers and differentiate between microcontrollers and microprocessors.
CO2:	**Familiarize** with the 8051 instruction set, including the classification of instructions (data transfer, arithmetic, logical, branching, machine control, etc.).
CO3:	**Understand** the operation of timers and counters in 8051, including the programming for various timer modes (mode 0, mode 1, mode 2) and time delay generation.
CO4:	**Develop** 8051 Assembly and 'C' programs using 8051 instruction set for embedded systems using microcontroller.
CO5:	**Interface** various input devices (pushbutton, thumb wheel switch, LM35, rain sensor etc.) with the 8051 and develop programs for their control.
CO6:	**Interface** various output devices (DAC, LED, LCD, SSD, stepper motor, DC motor etc.) with the 8051 and develop programs for their control.
CO7:	**Design and implement** application circuits using the 8051.

T. Y. B. Sc. (C. S.) Semester V	
Electronics Practical Lab-3	
Course Code: ELCMIP-352	**Number of Credits : 02**

Sr. No.	Title of Experiment/ Practical
Total 10 experiments are to be performed by student. Any five experiments from each group	
Group A	
1	Write and execute programs based on Arithmetic Instructions (8/16 bit Addition, Subtraction, Multiplication, Division) in Assembly and Embedded C.
2	Write and execute programs based on Logical Instructions (AND, OR, Rotate, etc.) in Assembly and Embedded C
3	Write and execute programs based on various addressing modes and assembler directives.
4	Write and execute programs based on Branch Instructions in Assembly and Embedded C.
5	Write and execute programs based on Looping, Counting, and Indexing concept in Assembly and Embedded C.
6	Write and execute program to introduce delay (e.g.1ms Delay) using Timer/Counter in Assembly and Embedded C.
7	Write and execute programs to generate various waveforms (square, triangular, saw tooth, trapezoidal) using timers in Assembly and C.
8	Write and execute programs to turn ON/OFF LED using interrupt in Assembly and Embedded C.
9	Write and execute programs to interface 4x4 matrix keypad in Assembly and Embedded C.
Group B (Based on Embedded 'C')	
1	Interfacing of thumbwheel & seven segment display to 8051 microcontroller
2	Interfacing LCD to 8051Microcontroller
3	Interfacing temperature sensor LM35/DHT11 and displaying temperature by configuring ADC (ADS1115).
4	Event counter using opto-coupler, seven segment LED/LCD display interface to 8051Microcontroller
5	Waveform generation using DAC Interface to 8051Microcontroller
6	Interface stepper motor and rotate in clockwise and anticlockwise.
7	ON/OFF temperature controller using LM35/DHT11 and switching relay.
8	Traffic light controller using 8051 microcontroller.
9	Speed control of DC motor.

Course Outcomes (COs): On completion of the course, the students will be able to:	
CO1	**Familiarize** with assembler directives and syntax of embedded C programs used for 8051 Controller.
CO2	**Write programs** with data transfer, arithmetic, logical, branching, machine control, instructions of the 8051 instruction set.
CO3	Write Functions to introduce delay (e.g.1ms Delay) using Timer/Counter in Assembly and embedded C programming
CO4	**Interface** various digital input/ output devices (pushbutton, thumb wheel switch, matrix keypad, LED, LCD, SSD, stepper motor etc.) with the 8051 and develop programs for their control
CO5	**Interface** various Analogue input/ output devices (LM35, rain sensor, DAC, thumb wheel switch, LED, LCD, SSD) with the 8051 and develop programs for their control.
CO6	**Analyze** observations of each experiment based on the aim and objectives of an experiment.
CO7	Acquire the skill to design and build his /her simple circuit ideas

T. Y. B. Sc. (C. S.) Semester VI	
Principles of Communication Systems	
Course code: ELCMIT-361	**No. of Credits: 2**

Unit No.	Title and Contents
Module 1	
1	**Introduction to Electronic Communication (9)** Introduction to Communication, Elements of Electronic Communication system. Types of communication: simplex, half duplex, full duplex, baseband and broadband. **Electromagnetic spectrum**: Frequency, Amplitude, Noise, Signal and channel bandwidth. Serial and parallel communication, Types of Serial communication: synchronous, synchronous. **Information Theory**: rate of information (data rate, baud rate), channel capacity, Signal to noise ratio, Noise Figure, Nyquist theorem, Shannon theorem. Introduction and necessity of **Error handling codes**: Hamming code (in detail), CRC. **Antenna**: Introduction, Need, working Principle, Parameters of antenna: Gain, Directivity, Radiation pattern, Beam width, Bandwidth, front to back ratio (FBR).
2	**Modulation and Demodulation (9)** Introduction to concepts of modulation and demodulation. Need of Modulation, Modulation techniques: Analog modulation: Amplitude, Frequency and Phase modulation, Equation of AM and FM Modulated wave, modulation index and frequency spectrum, working of transistorized amplitude modulator and diode demodulator. (Phase and Frequency modulation circuits are not expected). Pulse Modulation, Pulse Amplitude Modulation (PAM), PWM, PPM (Concepts only). FSK, QPSK, QAM. Digital Modulation techniques: Pulse Code Modulation (PCM), delta modulation.
Module 2	
3	**Multiplexing, Multiple Access System and Spread Spectrum (7)** Introduction to Multiplexing Principles, Concept of Time division multiplexing and Code division multiplexing. Introduction to multiple access and corresponding access types: FDMA, TDMA, CDMA. Concept and types of Spread Spectrum techniques: Frequency hopping Spread Spectrum, Direct Sequence Spread Spectrum.
4	**Wireless Communication Systems [5]** Introduction to wireless communication system, Need of wireless communication systems. Introduction to mobile communication, Cellular concept, Working of GSM, Handover, Introduction to GPRS. Introduction to RFID, ZigBee, Bluetooth and Wi-Fi (Comparison Based on range, data rate, frequency, Power).
Text and Reference Books:	
1	**Communication Electronics: Principles and Applications**, by Frenzel, 5th edition, Tata McGraw Hill Publication.
2	**Electronic Communication Systems,** by George Kennedy, Bernard Davis, 5th Edition (2008), McGraw-Hill Education.
3	**Data Communication and Networking**, Forouzan, 5th edition, Mc Graw Hill publication.

Course Outcomes (COs) On completion of the course, the students will be able to:	
CO1:	**Demonstrate** of Electronic Communication Systems.
CO2:	**Apply** Information Theory to Communication Systems.
CO3:	**Analyze** Modulation Systems.
CO4:	**Implement and Compare** Multiplexing Techniques.
CO5:	**Understand** Wireless Communication Technologies.
CO6:	**Demonstrate** Modern Communication Systems and Applications.

T. Y. B. Sc. (C. S.) Semester VI	
Electronics practical Lab-4	
Course Code: ELCMIP-362	**Number of Credits : 02**

Sr. No.	Title of Experiment/ Practical
Total 10 experiments or 8 experiments along with one mini project (equivalent to 2 practical) should be performed by the student.	
1	Study of Radiation Pattern of an Antenna.
2	Study the generation and detection of amplitude-modulated (AM) signals.
3	Study the generation of frequency-modulated (FM) signals.
4	Generate and analyze a pulse amplitude modulated (PAM) signal.
5	Study the generation of ASK signals.
6	Study the generation of FSK signals.
7	Implement and analyze 3 or 4 bit pulse code modulation.
8	Study of Sampling theorem.
9	Error Detection and Correction using Hamming code.
10	Study the principles of Time Division Multiplexing
11	Understand the concept of Code Division Multiplexing and its application.
12	To study the PN sequence generator.
13	Report writing on Wireless technologies like RFID, Zigbee, Bluetooth, and Wi-Fi.
14	Study of Frequency Division Multiplexing.

Course Outcomes (COs): On completion of the course, the students will be able to:	
CO1	Recognize need of various circuit elements in analogue and digital communication systems.
CO2	Acquire skills of studying and analyzing the responses of electronic communication circuits.
CO3	Analyze observations of each experiment based on the aim and objectives of an experiment.
CO4	Evaluate observed outputs with expected theoretical outputs.
CO5	Discuss the need and requirement of electronic communication systems in daily life.
CO6	Acquire the skill of design and build his /her simple circuit ideas

Question paper format for Semester End Examination NEP-2020,

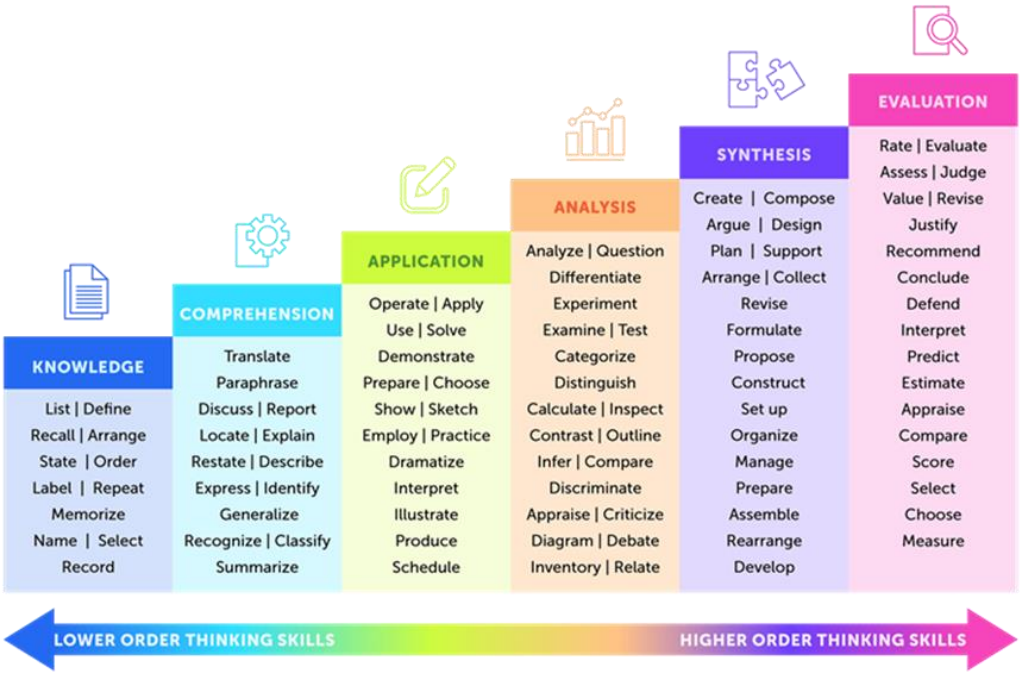
Time: 02 Hours	**Max Marks: 35**

Theory question weightage will be given to each topic equivalent to number of lecturers allotted to unit in a syllabus.

Instructions to the Candidate:

1. All Questions are compulsory.
2. Figures to the right indicates full marks.
3. Use of log table and scientific calculator is allowed.

Q. No.	**Question format**	**Question Type**	**Marks**
Q. 1	Attempt **any EIGHT (8)** of the following: **out of 10**	**Knowledge based questions:**	**8x1=8**
Q. 2	Attempt **any FOUR (4)** of the following: **out of 6**	**Comprehensions based questions**	**4x2=8**
Q. 3	Attempt **any TWO (2)** of the following: **out of 3**	**Analysis and application based questions**	**2x3=6**
Q. 4	Attempt **any TWO (2)** of the following: **out of 3**	**Synthesis and evaluation based questions**	**2x4=8**
Q. 5	Attempt **any ONE (1)** of the following: **out of 2**	**Synthesis and evaluation based questions**	**1x5=5**



Use Blooms taxonomy