COURSE OUTCOMES

COMPUTER SCIENCE

SEMESTER—I

Course Code	Course Title	Course Outcomes
1S-(USELT01)	Network Analysis and Digital Fundamentals	After completing the course, the students will be able to- CO1: Concept of Voltage and Current Sources. Kirchhoff's Current Law, Kirchhoff's Voltage Law, Mesh Analysis, Node Analysis, Star and Delta networks, Star-Delta Conversion, Principle of Duality, Superposition Theorem. CO2: Thevenin's Theorem, Norton's Theorem, Reciprocity Theorem, Maximum PowerTransfer Theorem, Two Port Networks: h, y and z parameters and their conversion. CO3: Number systems and codes: Decimal, binary, octal and hexadecimal number systems, base (radix) conversions, representation of signed and unsigned numbers, BCD code: 8421 code, Excess-3 code, gray code and parity code. Binary, octal and hexadecimal arithmetic: addition, subtraction by 1's and 2's complement methods. CO4: Study Logic gates and Boolean algebra: Basic logic gates; AND, OR and NOT gates ,universal gates: NAND and NOR gates. CO5: Study combinational gates: XOR and XNOR gates, Basic postulates and fundamentals theorem of Boolean algebra, Application of XOR gate as a controlled inverter.
(1S-USELT02)	Semiconductor Diodes and Analog Electronics	After completing the course, the students will be able to- CO1: Study Junction Diode and its applications: PN junction diode (Ideal and practical)–

		Constructions, Formation of Depletion Layer, Diode Equation and I-V characteristics, Idea ofstatic and dynamic resistance, dc load line analysis, Quiescent (Q) point, Zener diode, Reversesaturation current, Zener and avalanche breakdown, Schottky diode. CO2: Study Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms ripple factor and efficiency. Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. CO3: Study Bipolar Junction Transistor: Review of the characteristics of transistor in CE and CB configurations, Regions of operation (active, cut-off and saturation), Current gains α and β, Relations between α and β, dc load line and Q point. CO4: Study Amplifiers: Transistor biasing and Stabilization circuits, Fixed Bias and Voltage Divider Bias, Thermal runaway, stability and stability factor S. CO5: Study Transistor as a two Port network, h-parameter equivalent circuit for CE, CB and CC configuration, Small signal analysis of single stage CE amplifier: Hybrid equivalent circuit, Input and Output impedance, Current and Voltage gains. CO6: Study RC Coupled Amplifier: derivation of voltage gain in mid, low and high frequency range using h-parameters.
1S-USELP01	Practical	After completing the course, the students will be able to – CO1: To verify Maximum Power Transfer Theorem. CO2: To verify Superposition Theorem. CO3: To verify Thevenin's and Norton's Theorem. CO4: To verify Reciprocity Theorem.

		CO5: Study of basic logic gates. CO6: Verification of truth table for given Boolean expression. CO7: Study of Demorgan'stheorems.. CO8: Study of the R.B. I-V Characteristics of (a) p-n junction Diode, and (b) Zener diode. CO9: Study of Half wave rectifier. CO10: Study of center tap Full wave rectifier. CO11: Study of Full wave Bridge rectifier. CO12: Study of the Zener voltage regulator (Load regulation).

SEMESTER—II

Course Code	Course Title	Course Outcomes
2S-USELT03	Unipolar Devices and Linear Integrated Circuits	After completing the course, the students will be able to- CO1: StudyUnipolar Devices: JFET: Construction, working and I-V characteristics (output andtransfer), Pinch-off voltage, comparison of BJT and FET, parameters of JFET, JFET as anamplifier (common source), Construction and working of MOSFET, advantages and disadvantages of MOSFET, UJT: basic construction, working,equivalent circuit and I-V characteristics. CO2: Study Classes of Amplifiers: Class A, B and C Amplifiers, Cascaded Amplifiers: Two stageRC Coupled, transformer coupled and direct coupled Amplifiers and their Frequency Response.Feedback in Amplifiers: Concept of feedback, negative and positive feedback, advantages ofnegative feedback. CO3: Study Operational Amplifiers- characteristic of an Ideal and Practical operational

		amplifier,introduction to DC amplifier, Difference Amplifier, need of two power supplies, working ofdifference amplifier, block diagram of op-Amp (IC 741), open and close loop configuration,Frequency response, parameters of op-amp, Differential , common mode gain and CMRR, Slew Rate. CO4: Study Applications of op-amp: Concept of virtual ground, op-amp as an inverting amplifier,sign changer, as an non-inverting amplifier, unity gain amplifier, summing amplifier (as anadder), subtractor, integrator, differentiator, comparator, zero crossing detector, Schmitt trigger.
2S-USELT04	Digital Integrated Circuit	After completing the course, the students will be able to- CO1: Study Combinational logic Analysis and Design: Standard representation of logic functions(SOP and POS), Minimization techniques (Karnaugh map minimization up to 4 variables forSOP). CO2: Study Arithmetic circuits: Binary addition, Half and Full adders, half and full subtractor, Four bitbinary adder/subtractor using 2' compliment method (using IC7483 and IC7486). DataProcessing circuits: Multiplexer (2:1, 4:1and 8:1 MUX), Demultiplexer (1:2, 1:4 and 1:8DEMUX), Decoder, Encoder (decimal to BCD and priority encoder). CO3: Study Clock and Timer (IC 555), Introduction, Block diagram, Astable and Monostablemultivibrator circuits, Sequential circuits: Clock (Level and Edge triggered), SR, Clocked SR, D,and JK flip-Flops, TFF, Preset and clearoperations, Race around condition in JK Flip-Flop,Master- Slave JK (JKMS) Flip-Flop (Truth Tables and their Timing Diagram). CO4: Study Counters (4 Bits): Concept of counters, Types- Asynchronous and Synchronous,Asynchronous UP/Down counter, Modulus of a counter, Different Modified counters,

		decadecounter, Synchronous Counter, Ring and Johnson counters (Truth Table and Timing Diagram). CO5: Study Shift Registers(only up to 4-bits): SISO, SIPO, PISO and PIPO, D-A and A-Dconversion: 4 bit binary weighted and R-2R D-A converters, circuit and working, Accuracy andResolution, A-D conversion characteristics, single slope, dual slope and successiveapproximation ADC, Sample and hold circuit.
2S-USELP02	Practical	After completing the course, the students will be able to- CO1:Study of the output and transfer I-V characteristics of common source JFET. CO2: Study of the I-V Characteristics of UJT. CO3: Study of the RC Phase Shift Oscillator. CO4: Study of RC coupled amplifier (frequency response). CO5: Study of the Colpitt's Oscillator. CO6: Study of an inverting amplifier using Op-amp (741) for dc voltage. CO7: Study of non-inverting amplifier using Op-amp (741) for dc voltage. CO8: Study of adder using Op-amp (for dc). CO9: Study of subtractor using Op-amp (for dc). CO10: Study of 4:1 MUX and Construction of 8:1 MUX using 4:1 MUX. CO11: Study of 1:4 DEMUX and 1:8 DEMUX.

SEMESTER—III

Course Code	Course Title	Course Outcomes
3S-USELT05	Power Amplifier, Oscillators and Power Supplies	After completing the course, the students will be able to- CO1: Study Power amplifier: Introduction to power transistor, difference between voltage and power amplifier, class Aamplifier with resistive load and its efficiency, transformer coupled class A power amplifier and its efficiency,push pull amplifier, complimentary- symmetry power amplifier. CO2: Study Oscillator:- Introduction, Barkhausen criterion for oscillation, frequency determination device,L-C oscillator citrcuit, phase shift oscillator, Wein bridge oscillator , transistor Colpitts oscillator and Hartleyoscillator. CO3: Study Power Supply: Unregulated DC Power Supply and its Disadvantages, Regulated DC Power Supply, Termsrelated to Regulated Power Supply, Concepts of Series and Shunt type Regulator, Zener regulator, TransistorRegulator, Series Pass Regulator, Short Circuit Protection. CO4: Study IC Voltage Regulator: Advantage of Three Terminal Voltage Regulator, LM 317 Voltage Regulator:Functional block diagram, Working and Application, IC 78XX, IC 79XX three terminal Regulators, Dualpower supply using IC 78XX and 79XX.
3S-USELT06	Microprocessor	After completing the course, the students will be able to- CO1: Study Microcomputer Organization : Input/Output Devices. Data storage (RAM and ROM), Computermemory. Memory organization & addressing. Memory Interfacing. Memory Map. CO2: Study 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Pin-out diagram of8085.

		CO3: Study Data and address buses. Registers. ALU. Stack memory. Program counter. Timing and Control Unit, Instruction decoder, Flags, PC & SP, Interrupts, Address and Data line multiplexing, Instruction and data Format. CO4: Study Addressing Modes: Direct Addressing, Register Addressing, Register Indirect Addressing,Immediate Addressing and Implicit Addressing. Instruction Set: Data Transfer Group, ArithmeticGroup, Logical Group, Branch Group, Stack, I/O and Machine Control Group. Flowchart andstructured programming. Subroutine and stack operation. CO5: Study 8085 Programming : Introduction to ALP, ALP on Data transfer including stacks. Arithmetic,logical, branch, and control instructions. Subroutines, delay loops. CO6: Study Timing & Control circuitry.Timing states. Instruction cycle, Timing diagram of MOVand MVI. Hardware and software interrupts. CO7: Study Intel 8086: Block Diagram and its explanation, Comparison of Intel 8085 and Intel 8086, Modesof 8086: Minimum and Maximum, Concept of Queue, Flag registers, Instruction Sets, Addressingmodes and Simple Assembly Language Programming.
3S-USELP03	Practicals	After completing the course, the students will be able to- CO1: Study of Transformer couple Class A Amplifier. CO2: Study of Push-Pull Amplifier. CO3: Study of Zener Diode as a Voltage Regulator CO4: Study of IC 78XX as voltage regulator. CO5: Study of IC 79XX as voltage regulator. CO6: Study of Wien Bridge Oscillator.

		CO7: Study of Phase Shift Oscillator. CO8: ALP (Microprpcessor-8085), for data transfer. CO9: ALP (Microprpcessor-8085), for 8-bit subtraction. CO10: ALP (Microprpcessor-8085), for multiplication. CO11: ALP (Microprpcessor-8085), for Division CO12: ALP (Microprpcessor-8085), for 1's and 2's complement of 8-bit numbers.

SEMESTER—IV

Course Code	Course Title	Course Outcomes
4S-USELT07	Communication Electronics	After completing the course, the students will be able to- CO1: Study Electronic communication: Introduction to communication, Block diagram of an electroniccommunication system. CO2: Study Electromagnetic communication spectrum, band designations and usage.Concept of Noise, signal-to-noise (S/N) ratio. Brief idea of frequency allocation for radiocommunication system in India (TRAI). Channels and base-band signals. CO3: Study Analog Modulation: Need for modulation, Amplitude Modulation, modulation index and frequencyspectrum. Amplitude Demodulation, Concept of Single side band generation and detection.Frequency Modulation (FM) and Phase Modulation (PM), modulation index and frequency spectrum,equivalence

		between FM and PM. CO4:Study Generation of FM using VCO, FM detector (slope detector), Qualitative idea of Super heterodynereceiver. CO5: Study Analog Pulse Modulation: Channel capacity, Sampling theorem, Basic Principles-PAM, PWM,PPM, modulation and detection technique for PAM only, Multiplexing. CO6: Study Digital Pulse Modulation: Need for digital transmission, Pulse Code Modulation, Concept ofAmplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK). CO7: Study Satellite Communication– Introduction, need, Geosynchronous satellite orbits, geostationarysatellite advantages of geostationary satellites. CO8: Study Mobile Telephony System – Basic concept of mobile communication, frequency bands used inmobile communication, concept of cell sectoring and cell splitting, SIM number, IMEI number, ideaof GSM, CDMA, TDMA and FDMA technologies, GPS navigation system.
4S-USELT08	Interfacing, PPI devices and Microcontroller	After completing the course, the students will be able to- CO1: Study Interfacing: Need of Interfacing, Address space Partitioning: Memory Mapped I/O Scheme and I/OMapped I/O Scheme, Memory and I/O interfacing: Memory interfacing, I/O interfacing. CO2: Study Data Transfer Schemes: Programmed Data Transfer Schemes, Synchronous, Asynchronous and Interrupt driven data transfer, DMA data transfer scheme: burst mode &cycle stealing mode and their limitations. CO3:Study Interfacing devices: Introduction, Programmable Peripheral Interface (PPI) Intel 8255: Blockdiagram with discussion on each

		block, operating modes of 8255. CO4: Study Control Groups and Control Word,I/O Ports, Programmable Counter/Interval Timer Intel 8253: Schematic Diagram, Read/Write Logic,Control Word, Operation (Mode 0-Mode 5). Programmable DMA Controller, Intel 8257: SchematicDiagram, I/O signals. BSR (Bit Set/Reset) Mode. CO5: Study 8051 microcontroller: Introduction and block diagram of 8051 microcontroller, architecture of8051, overview of 8051 family, 8051 assembly language programming, Program Counter and ROMmemory map, Data types and directives, Flag bits and Program Status Word (PSW) register, Jump,loop and call instructions. CO6: Study 8051 I/O port programming: Introduction of I/O port programming, pin out diagram of 8051microcontroller, I/O port pins description & their functions, I/O port programming in 8051 (usingassembly language), I/O programming: Bit manipulation.
4S-USELP04	Practical	After completing the course, the students will be able to- CO1: Study of Amplitude Modulation and Demodulation. CO2: Study of VCO using IC 566. CO3: Study of PAM. CO4: Study of PWM. CO5: Study of counter program using 8255 PPI and microprocessor 8085. CO6: Study of SSD Interfacing using 8255 PPI and microprocessor 8085. CO7: Study of LED Interfacing using 8255 PPI and microprocessor 8085. CO8: Study of microcontroller-8051.

SEMESTER—V

Course Code	Course Title	Course Outcomes
5S-USELT09-DSE-1A	Electronic Instrumentation	After completing the course, the students will be able to- CO1: Recognize the evolution and history of units and standards in Measurements.Measurement of Impedance-A.C. bridges, General condition of bridge balance, ScheringBridge, Owens Bridge. CO2: Identify the various parameters that are measurable in electronic instrumentation. CO3: Study Ocilloscope, their block diagram, digital Storage Oscilloscopes. Single trace and dual trace CRO. CO4: Study Basic Principles of phase locked loop (PLL), Phase detector (XOR & edge triggered), Voltage Controlled Oscillator, lock and capture. Basic idea of PLL. Lock-inamplifier, Idea of techniques for sum and averaging of signals. CO5: Classify the transducers and description of their characteristics.
5S-USELT10-DSE-1B	C-Programming-I	After completing the course, the students will be able to- CO1: Study Concepts of Algorithm and Flowcharts, problem solving examples using algorithm and Flowchart. Types of Programming languages, Characteristics of higher level language, Compiler and Interpreter, Importance of C. CO2:StudyOperators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise and special operators. CO3: Study Managing Input and Output Operators:

		Reading a character, writing a character, formatted input, formatted output. Decision making and branching: Decision making with IF statement, Simple IF statement, the IF ELSE statement, Nesting of IF … ELSE statements, The ELSE IF ladder, the switch statement, the turnery (? :) Operator, the GOTO statement. CO4: Study decision making and Looping: The WHILE statement, the DO statement, The FOR statement, Nesting in loop, Jumps in loops, Break and continue.
5S-USELP03	Practical	After completing the course, the students will be able to- CO1: Study of Series type Ohmmeter. CO2: Study of Shunt type Ohmmeter. CO3: Study of Schering Bridge. CO4: Study of Owen's bridge. CO5: Study/Use of CRO for measurement of voltage and frequency. CO6: Study/Use of CRO for determination of frequency and phase. CO7: To determine the Characteristics of LVDT. CO8: At least 2 programs based on C-operators and expressions. CO9: At least 2 programs on Input / Output. CO10:At least 2 programs on decision making and looping using do-while statement. CO11: At least 2 programs on decision making and branching using if, if-else, switch statements. CO12: At least 2 programs on decision making and branching using nesting of if-else and elseif ladder.

SEMESTER—VI

Course Code	Course Title	Course Outcomes
6S-USELT13	Photonic Devices and Power Electronics	After completing the course, the students will be able to- CO1: Study classification of photonic devices. Interaction of radiation and matter, Radiative transition and optical absorption. Light Emitting Diodes- Construction, materials and operation. CO2: Study photodetectors: Photoconductor. Photodiodes (p-i-n, avalanche) and Photo transistors, quantum efficiency and responsivity. Photomultiplier tube. Solar Cell: Construction, working and characteristics LCD Displays: Types of liquid crystals, Principle of Liquid Crystal Displays, applications, advantages over LED displays. CO3: Study power Devices: Need for semiconductor power devices, Power MOSFET (Qualitative). Introduction to family of thyristors. Silicon Controlled Rectifier (SCR)- structure, I-V characteristics, Turn-On and Turn-Off characteristics, ratings, Gate-triggering circuits. Diac and Triac- Basic structure, working and V-I characteristics. Application of Diac as a triggering device for Triac. CO4: Study Applications of SCR: Phase controlled rectification, AC voltage control using SCR and Triac as a switch. Power Invertors- Need for commutating circuits and their various types, dc link invertors, Parallel capacitor commutated invertors, Series Invertor, limitations and its improved versions, bridge invertors.
6S-USELT14	C-Programming-II	After completion of the course, the student is able to- CO1: Study arrays and User Defined Function : One-dimensional arrays, Two-dimensional arrays, Initialization of two dimensional arrays, Concept of Multidimensional arrays. Need for User Defined Functions, Concept Associated with Functions, Return Values and Their Types. Category of

		functions: No arguments and no return values, arguments but no return values, arguments with return values. CO2: Study structure, Unions and Pointers : Basic Concept of Structure, Operations on Structure, Array of Structure, Union, Difference in union and Structure. CO3: Study basic Concept of pointers, Pointer Expression, Pointers and arrays, Pointer and Character String, Pointer to Function. CO4:Study file management: Introduction, Defining and Opening File, Closing a File, I/O Operations on File. Error Handling, Random Access to Files, Command Line Arguments. CO5: Study principle of Object Oriented Programming, Software evaluation, Oop paradigm. Basic concept of Oop, Benefits of Oop, Application of Oop. Introduction to C++, Applications of C++, Difference between C and C++.
6S-USELP04	Practical	After completing the course, the students will be able to- CO1: To determine characteristics of (a) LEDs, (b) Photo voltaic cell and (c) Photo diode. CO2: To study the Characteristics of LDR and Photodiode with (i) Variable Illumination intensity, and (ii) Linear Displacement of source. CO3: Output and transfer characteristics of a power MOSFET. CO4: Study of I-V characteristics of SCR CO5: SCR as a half wave and full wave rectifiers with R and RL loads. CO6: Programs on one dimensional array. CO7: Programs on two dimensional arrays. CO8: Programs on user defined functions (No

		argument no return value). CO9: Programs on user defined functions (Argument but no return value). CO10: Programs on user defined functions (Argument with return value). CO11: Programs on user defined functions (Nesting of function). CO12: Programs on user defined functions (Recursion).