Gulbarga University
Kalaburagi
Department of Applied Electronics

Course Outline and Syllabus for Master of Science (M. Sc) in Applied Electronics under CBCS and CAGP

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L = Lecture  T = Tutorials  P = Practical  
4 Credits of Theory = 4 Hours of teaching per week  
2 Credit of Practical = 4 hours per week
FIRST SEMESTER

HCT 1.1: Semiconductor and Microwave Devices
4 Credits  64 Hours

Preamble:
The study of high power and microwave devices are the emerging fields in electronics. Construction, working and applications of high power and microwave devices are explained in detail in this paper. The study of this paper helps for pursuing the research in this field.

UNIT-I:
Thyristors: Characteristics, thyristor turn-on, turn-off, types of thyristors, phase control thyristors, fast switching thyristors, gate-turn off thyristor, reverse conducting thyristor, light activated SCR, FET controlled thyristor, MOS controlled thyristors. Series operations of thyristor, Parallel operation of thyristor, Thyristor firing circuits. 16 Hours

UNIT-II
DC Choppers: Introduction, principle of step-down and step-up operation, chopper classification, switching mode regulators, buck, boost, buck-boost regulators. Thyristor chopper circuits. Power supplies-Introduction, DC power supplies-switched mode DC power supplies, AC power supplies switched mode AC power supplies. 16 Hours

UNIT-III
Microwave devices: Klystron, velocity modulation, bunching process, reflex klystron, efficiency, electronic admittance. Magnetron and Traveling wave tubes: Principle of operation of magnetron, microwave characteristics. Helix TWT’s, amplification process, wave modes and gain considerations. 16 Hours

UNIT-IV
Microwave solid state devices: Microwave transistor, MOSFETs, transferred electron devices, Gunn effect, principle of operation, modes of operation. LSA diode, Read diode, IMPATT and TRAPATT diodes, parametric devices, non-liner reactances, Manley Rowe power relations, small signal methods, parametric amplifiers, parametric up-down converters and applications. 16 Hours

Reference books:

HCT 1.2: Electronic Instrumentation
4 Credits  64 Hours

Preamble:
An electronic instrument is the one which is based on electronic principles for its measurement function. A measuring system based on different transducers, is described in detail. An electrical conductivity measurement, different digital instruments, telemetry and data acquisition systems are part of this paper.

UNIT-I
Instrumentation: Introduction, definition, purpose of instrumentation. Measurement, types of measurements, importance of measurements, classification of instruments, generalized measurement system, instrument characteristics, error, types of errors. 16 Hours
UNIT-II
**Transducers:** Definition, types of transducers, classification of transducers, resistive, inductive, capacitive, piezoelectric, photoelectric transducers. Temperature transducers, pressure and displacement transducers, strain gauges, optical transducers, detectors, biomedical electrodes and transducers.  

**16 Hours**

UNIT-III
**Electrical conductivity measurement:** Conductivity cell, AC electrodynamometer, pH measurements, pH meter. Digital instruments - DFM, DMM, Automation in digital instruments, auto-zeroing, auto-ranging, automatic polarity indication. Digital storage oscilloscope. PC for measurement and control: Role of PC in instrumentation, application of PC for measurement of displacement, temperature measurement and control. AC motor speed measurement and control.  

**16 Hours**

UNIT-IV
**Telemetry and data acquisition system:** Introduction, types of data acquisition system, basic elements of data acquisition system, Converters – ADC, DAC, Multiplexers, Demultiplexers, Sample and hold circuit. Q meter, lock in amplifier, thickness measurement using LVDT, humidity measurement. Recorders - X-Y recorder, strip chart recorder, magnetic tape recorder.  

**16 Hours**

Reference books:
3) Rajesh Hongal: DBM PC and clones.

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**HCT 1.3: Electromagnetics and Antennas**  

4 Credits  

**64 Hours**

**Preamble:**
This paper provides a broad and applications-oriented introduction to electromagnetic waves and antennas. Current interest in these areas is driven by the growth in wireless and fiber-optic communications, and information technology. Communications, antenna, radar, and microwave engineers deal with the generation, transmission, and reception of electromagnetic waves. Devices working on ever-smaller integrated circuits and at much higher frequencies account wave propagation effects at the chip and circuit-board levels. Communication networks use wave guiding systems, various antennas and arrays. They are discussed in this paper.

UNIT – I:
**Introduction:** Transverse fields, TE and TM waves and their characteristics, TEM waves, TE and TM modes, velocity of propagation, attenuation in parallel plane guides, wave impedance, Smith chart, impedance matching with stubs, rectangular waveguides and Q of waveguides, Cut off frequencies, dominant mode, power transmitted in a lossless waveguide, power dissipation in a lossy waveguide.  

**16 Hours**

UNIT – II
**Waveguide components and networks:** Cavity resonators, Q of cavity resonator, cavities, slow wave structure, microwave hybrid circuits and S parameters, waveguide Tees, directional couplers, phase shifters, attenuators and slide screw tuner.  

**16 Hours**
UNIT – III
Basic antenna parameters: Radiation pattern, radiation intensity, directivity, radiation resistance, efficiency and gain. Effective aperture antennas, effective height, dipole antenna, helical antenna, horn antennas and aperture antennas. 16 Hours

UNIT – IV
Antenna and arrays: Antenna characteristics, radiation, potential function and EM fields, potential function for sinusoidal oscillator, alternating current element. Antenna arrays, Array of two isotropic sources, principle of pattern multiplication. Array of n-isotropic point sources, principle of pattern multiplication technique, suppression of side lobes. 16 Hours

Reference Books:

SCT1.1: Digital Electronics and 8085 Microprocessor
4 Credits
64 Hours

Preamble:
Digital electronics is one of the fundamental course electronics contains transistor logics, logic families, basic logic gates, converters and logic circuits. These are the base for microprocessors. In this paper, 8-bit microprocessor is taught in detail which also includes important peripheral interfacing devices and applications.

UNIT-I
Digital Electronics: Logic families and their characteristics, TTL characteristics, open-collector gates, tri-state gates, difference between TTL types including low power, Schottky standard TTL and high speed gates, introduction to MOS and CMOS logic families, noise considerations, review of DAC, ADC, multiplexers and de multiplexers. 16 Hours

UNIT-II
Intel 8085 microprocessor: Architecture, addressing modes, instruction set, timing diagrams, pins and signals, memory read and I/O read, memory write and I/O write Memory organization: Memories, memory array design, memory management concepts, cache memory organization. 16 Hours

UNIT-III
Input/Output: Standard I/O, programmed I/O, memory mapped I/O, conditional and unconditional programmed I/O, typical I/O circuits, interrupt driven I/O, DMA, coprocessors, 8085 based system design. 16 Hours

UNIT-IV
Peripheral interfacing: Programmable peripheral devices: 8255, 8257, 8259, 8279, 8275, 8237, ADC and DAC. 16 Hours

Reference Books
SCT1.2: Numerical Analysis

4 Credits

Preamble
Numerical analysis has been used in a wide variety of mathematical and logic problems. The mathematical analysis underlying the approximation techniques, differentiation, integration, functional approximation and solution to different linear systems is discussed.

UNIT-I
Interpolation and approximation: Lagrange and Newton interpolation, Gregory-Newton interpolations, Hermite interpolation, Newton’s general interpolation. 16 Hours

UNIT-II
Numerical differentiation and integration: Numerical differentiation, extra-polation methods, numerical integration, trapezoidal rule, Simpson’s 1/3rd rule, Newton-Cites integration methods. 16 Hours

UNIT-III
Functional approximation: Least square approximation, minimum and maximum error technique, least square curve fitting procedure, fitting a straight line, non-linear curve fitting. 16 Hours

UNIT-IV
Solution of linear systems: Direct method, Gauss elimination method, matrix inverse method, Gauss-Siedel method, Numerical solution of ordinary differential equations, Euler’s method, Ranga-Kutta method. 16 Hours

Reference Books
SECOND SEMESTER

HCT 2.1: Computer Fundamentals and C Programming

4 Credits

Preamble:
A computer also called as a data processor store, process, and retrieve data whenever desired. Basic organization, operations performed, Input and Output units and its functions, Types of storage used in a computer system are explained in detail along with the operating systems. C is a general-purpose, computer programming language. C provides constructs that map efficiently to typical machine instructions, and has found lasting use in applications in assembly language, including operating systems, as well as various application software for computers ranging from supercomputers to embedded systems.

UNIT-I

UNIT-II
Introduction to C programming: Lexical elements of C; character set, constants, variables, variable declaration, data types, reserves words. Input/output in C, operators and expressions in C, Control Structures in C; Unconditional, bidirectional and multidirectional conditional statements, loop control statement, break and continue statements.

UNIT-III
Functions in C: C library functions, user-defined functions, declaration of functions, recursive functions. Arrays in C, initialization, arrays to functions, strings. Pointers in C; Concept of pointers, declaration and initialization of pointers, pointers as addresses. C-Preprocessor and file handling in C.

UNIT-IV
Introduction to C++: Fundamentals of C++, applications of C++, features of object oriented program (OOP), basic concepts of OOP, benefits of C++, Structure of C++ program, Tokens, expressions and control statements, Functions in C++, classes and objects, operator overloading, inheritance, managing console I/O operations, differences between C and C++.

Reference Books:

HCT 2.2: 8086 Microprocessor and Interfacing

4 Credits

Preamble:
The 16-bit Microprocessor families are designed primarily to complete with microcomputers and are oriented towards high-level languages. They have powerful instruction sets and capable of addressing mega bytes of memory. It also addresses various directives to execute...
the assembly language program. Various data communication networks and protocols along with the trends in the development in Intel 80x86 microprocessors, math co-processor are explained in this paper.

UNIT-I
8086 Microprocessors: Architecture, memory organization, input and output structure, programmable hard ware resistors, addressing modes, minimum and maximum modes, systems bus timing, interrupts and interrupts service routines – 8086 interrupts and interrupts actions, interrupt and ROM-BIOS services, hardware and software interrupts, interrupt vectors used to store pointers, interrupt service routine. 16 Hours

UNIT-II
8086 instructions and assembly language programming: Assembler instruction format, data transfer instructions, arithmetic and logical instructions, branch instructions, processor control instructions, string operator instructions, program segments, procedures, program structure, programming with macros, input-output structure and programming, program development tools, program development process. 16 Hours

UNIT-III
Assembler directives: Symbols, variables and constants, data definitions and storage allocation directives, program organization directives, alignment directives, program end directives, value returning attribute directives, procedure definition directives, macro definition directives, data control directives, branch displacement directives, header file inclusion directive, target machine code generation control directives. 16 Hours

UNIT-IV
Data communication and networks: Asynchronous serial data communication, serial data transmission methods and standards, synchronous serial data communication and protocol, LAN and WAN. Advanced processors architecture: Intel 80186, 80286, 80386, 80486 and Pentium processors, MATH co-processors. 16 Hours

Reference books:
2) M. Rafiquzzaman: Microprocessors and microcomputer based system design, UBS, 1993.

SCT 2.1: Fiber Optic Communication 64 Hours

Preamble:
Fiber-optic communication systems has revolutionized the telecommunication technology. The objective of this paper is to describe fiber-optic communication systems in a comprehensive manner. The emphasis is on the fundamental aspects, such as types of optical fibers, signal degradation, optical sources, and optical receiver systems.

UNIT-I
Optical fibers: Numerical aperture, acceptance angles, types of optical fibers, rays and modes, mode theory of circular waveguides, fiber materials. 16 Hours
UNIT-II

Signal degradation: Attenuation, scattering losses, bending losses, dispersion losses, radiation losses, core and cladding losses, signal distortion, pulse broadening in optical waveguides.

UNIT-III

Optical sources and Detectors: LEDs- LED structure, Light source materials, Quantum efficiency and LED power, The LASER diodes- Principle, LASER diode modes, DFB LASER diode, power current characteristics, LASER diode rate equations, External quantum efficiency, Resonant frequencies.
Photodetectors: PIN photodetector, Avalanche photodiodes, photo detector noise- noise sources, signal to noise ratio, response time, comparison of photodetectors

UNIT-IV

Optical receiver: Fundamental receiver operation, digital receiver performance- probability of error, receiver sensitivity, quantum limit, coherent detection- fundamental concepts, homodyne detection system, heterodyne detection system, analog receivers.

Reference Books:
2) Siddalingesh Bandi: Optical fiber communication, Star-tech education, 2011.
3) John M. Senior: Optical fiber communication, PHI, 2/e, 1996.

SCT 2.2: Analog Control System Design

4 Credits
64 Hours

Preamble:
Design of electronic analog control systems have become the important aspect of technological advancement. Hence, the fundamentals involved in the systems such as steady state and transient response analysis becomes essential section of this paper. It also deals with root locus techniques, frequency response methods, compensation techniques and analysis.

UNIT-I

Steady state and transient response analysis: Steady state and transient response analysis of first and second order linear time-invariant systems subjected to unit step, ramp and impulse inputs. Time domain and frequency domain analysis; absolute stability, relative stability and steady state error, Routh’s-Hurwitz stability criterion.

UNIT-II

Root locus techniques: Root locus method, angle and magnitude conditions, Root locus plots of first and second order systems.

UNIT-III

Frequency response methods: Steady state solutions of sinusoidal input, Bode plots, Nyquist plots, Nyquist stability criterion.

UNIT-IV

Compensation techniques: Need for compensation, series and parallel compensation,
compensation in terms of root locus and Bode plots, lag-lead and lag-lead compensation.

Reference Books:

OET 2.1: Fundamentals of Electronics

5 Credits

Preamble:
This paper helps in understanding the basic electronic concepts. The use of electronics in day to day life is explained. Applications of electronics can be understood by any science student by this paper.

UNIT-I

UNIT-II
Semiconductors: Junction Diodes, p-n junction, an unbiased p-n junction, a biased p-n junction and V-I characteristics of P-n junction. Some special P-N junction:- Photodiodes, LED and Solar Cell. Junction transistor, Transistor static characteristic Self-bias or emitter bias, Two-port representation of Transistor (hybrid Parameter) JFET: Static Characteristic of FET comparison of FET with Bipolar transistor. Applications of BJT and JFET.

UNIT-III
Operational Amplifier characteristics and Applications: Introduction, Ideal Op-Amp, DC and AC Characteristics.: Instrumentation Amplifier, V to I and I-V converter Precision rectifier, Differentiator and Integrator. Comparator Schmitt trigger wave generators (Square wave and Triangular wave) and first order Low pass and High pass filters.

UNIT-IV
Special IC series: Op-Amp regulator, Design of power supplies using voltage regulator ICs, 555 Timer as Monostable and Astable operation. D-A and A-D converters.

Reference books:
2) D. Roy Choudhary and Shail Jain: Linear Integrated Circuit, New Age Inter. (P) Ltd.
3) Op-Amp and Linear Integrated Circuits: R.A. Gaikwd, PHI of India Ltd.

OET 2.2: Basic Electronics

5 Credits

Preamble:
In this paper, construction of many semiconductor devices used in electronics and their
applications are explained. The method of biasing, amplifiers, oscillators and operational amplifiers are given in detail. The study of this paper helps in understanding many electronic concepts.

UNIT-I
Semiconductor Diodes and Applications: p-n junction diode, Characteristics and Parameters, Diode approximations, DC load line, Temperature dependence of p-n characteristics, AC equivalent circuits, Zener diodes Half-wave diode rectifier, Ripple factor, Full-wave diode rectifier, Other full-wave circuits, Shunt capacitor - Approximate analysis of capacitor filters, Power supply performance, Zener diode voltage regulators, Transistor: Bipolar Junction transistor, Transistor Voltages and currents, amplification, Common Base, Common Emitter and Common Collector Characteristics, DC Load line and Bias Point.

UNIT-II
Biasing Methods: Base Bias, Collector to Base Bias, Voltage divider Bias, Comparison of basic bias circuits, Bias circuit design, Thermal Stability of Bias Circuits (Qualitative discussions only). Other Devices: Silicon Controlled Rectifier (S.C.R), SCR Control Circuits, More S.C.R applications; Unijunction transistor, UJT applications, Junction Field effect Transistors(Exclude Fabrication and Packaging), JFET Characteristics, FET Amplifications.

UNIT-III
Amplifiers and Oscillators: Decibels and Half power points, Single Stage CE Amplifier and Capacitor coupled two stage CE amplifier(Qualitative discussions only), Series voltage negative feedback and additional effects of Negative feedback(Qualitative discussions only), The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley, Colpitts and crystal oscillator (Qualitative discussions only).

UNIT-IV
Introduction to Operational Amplifiers: Ideal OPAMP, Saturable property of an OP AMP inverting and non inverting OPAMP circuits, need for OPAMP, Characteristics and applications - voltage follower, addition, subtraction, integration, differentiation; Numerical examples as applicable Cathode Ray Oscilloscope (CRO).

Reference Books:
THIRD SEMESTER

HCT 3.1: Networks and Systems

4 Credits
64 Hours

Preamble:
This paper explains the study of network functions, state space variables and control engineering. The time and frequency domain analysis of modern control systems and their important applications are explained in this paper.

UNIT-I
Network functions: Driving point impedance, transfer functions, poles and zeros and their significance, s-plane, location of poles and zeros in s-plane, time domain behavior from pole zero plot, amplitude and phase response from pole zero diagram. PR functions and driving synthesis: Properties of PR function, necessary and sufficient condition and their applications. One port network in canonical forms, Cauer and Foster forms.

UNIT-II
State variable analysis: Introduction, state variable approach, state response representation, transfer function. Linear transformations, diagonalization, matrix solution to non-homogeneous state equations, minimum set state variable formations.

UNIT-III:
Control systems: Open loop and closed loop control systems. Transfer functions of first order and second order linear system, block diagram and signal flow graphs, Mason’s gain formula. Study state and transient response analysis: Study state and transient response analysis of first and second order linear time invariant system subjected to unit step, ramp and impulse inputs.

UNIT-IV

16 Hours

Reference books:

5) K. Ogata: Modern Control Engineering, 2/e, PHI, 1990.

HCT 3.2: Microwave Electronics and Measurements

4 Credits
64 Hours

Preamble:
This paper mainly concentrates on microwave electronics and measurements. The microwave components have been reinvented in the form of strip line and microstrip form and this MIC technology has drastically reduced the size as well as cost. Moreover, the method of measurements is also discussed in this paper. This specific study enables the
student to work in R & D organizations for further studies and jobs in private/Govt. Sectors.

UNIT-I
Transmission lines: Strip lines, microstrip lines, types of microstrip lines, hybrid integrated circuits-fabrication. Microwave components using strip lines, strip lines-advantages disadvantages.  

UNIT-II
Impedance matching and tuning: Matching with lumped elements, lumped elements for microwave integrated circuits, single and double stub tuning. Quarter wave transformers, Chebyshev transformer and tapered lines.  

UNIT-III
Power dividers and directional couplers: Properties of dividers and couplers, T junction power divider, the Wilkinson power divider, coupled line directional couplers, the large couplers. Broad band amplifier design and oscillator design.  

UNIT-IV
Microwave measurement: Basic field equation, unit of measurement, free space attenuation, conversion of transmitter and receiver power and voltage to electric field intensities. Microwave enclosures and hazards: Electromagnetic compatibility, plane wave propagation in shielded room, plane wave propagation in anechoic chamber, microwave biological effects, Safety standards of microwave radiation.  

Reference books:

4) Peter A Rizzi: Microwave Engineering, PHI, New Delhi.

SCT 3.1: Modern Digital Communication

4 Credits 64 Hours
Preamble: Modern Digital Communication deals with fundamental digital waveforms in different formats and codes. The modulation of pulse in different types is also explained. Digital Communication and various techniques involved in data transfer are also covered.

UNIT-I

UNIT-II
UNIT-III

Digital communications: Synchronization, Asynchronous transmission, Probability of bit error in baseband transmission, The matched filter, Optimum terminal filters, Bit timing recovery, Eye diagrams, Digital carrier systems, Carrier recovery circuits, DPKS.  

16 Hours

UNIT-IV


16 Hours

Reference Books:


SCT 3.2: Power and Industrial Electronics

4 Credits

Preamble:  
This papers deals with basic power and industrial electronic devices. Their construction, different types, characteristics and applications are explained. It will be useful for the design and development of system.

UNIT-I

Thyristors: Characteristics, thyristor turn-on, turn-off, types of thyristors, phase- control thyristor, fast- switching thyristor, gate-turnoff thyristor, reverse conducting thyristor, light activated SCR, FET controlled thyristor, MOS controlled thyristors, Series of thyristors, parallel operation of thyristors, Thyristor firing circuits.  

16 Hours

UNIT-II


16 Hours

UNIT-III


16 Hours

UNIT-IV

DC and AC drives: Basic characteristics of DC motors, operating modes. Single phase drives-half - wave and full-wave converter drives. Induction motor drives-performance characteristics, stator voltage control, rotor voltage control, voltage control, voltage current and frequency control. Control of stepper motors.  

16 Hours
Reference books:

OET 3.1: Communication and Digital Electronics

5 Credits

Preamble:
Communication is an inseparable part of modern life. The use of radio waves and various communication techniques have been explained. The significance of digital electronics and their uses are also taught in this paper. The syllabus mentioned in this paper is more useful to any science graduate to understand the applications of electronics.

UNIT-I
Radio wave Propagation: Ground or surface wave, Space or tropospheric wave and Sky wave, Ionosphere, Effect of Ionosphere on Radio waves, Skip distance, maximum Usable frequency and Ionospheric fading. Antenna: Introduction, loop and ferrite rod antenna, Yagi-Uda, Dish antenna and Microstrip antenna (Qualitative).

16 Hours

UNIT-II
Modulation and detection: Modulation, AM, Power in AM, FM, Comparison of AM & FM. Generation and detection of AM wave. Super-heterodyne radio receiver (Block Explanation)

16 Hours

UNIT-III
Optical fiber communication: Principles of light transmission, Fiber index profiles, Modes of propagation, losses in fibers. Types of Light Sources and Photo detectors (Qualitative).

16 Hours

UNIT-IV

16 Hours

Reference books:
2) Electronic Communications: D. Roddy and J. Coolen, PHI of India ltd.,

OET 3.2: EM Theory and Microwave Devices

5 Credits

Preamble:
This paper deals with EM theory and microwave devices. This paper gives exposure to the electric field and magnetic field and combination of these two fields forming EM waves. Microwave waveguide components and microwave devices such as GaAs diode, READ diode, IMPATT, BARITT diodes are explained along with PIN and Schottky diodes. This
enables the students to understand the basic EM theory and microwave devices.

UNIT-I
Electromagnetic waves: Wave propagation-electric and magnetic wave equations, uniform plane wave, relation between E&H for a uniform plane wave, solution of a wave equation for a uniform plane wave, uniform plane wave in conducting medium, low loss dielectric medium, perfect dielectric medium, intrinsic impedance of dielectric and conducting mediums, derivation of propagation constant, attenuation constant, phase velocity and wave length, polarization of plane waves, linear, elliptic, circular polarization. 16 Hours

UNIT-II
Microwave Transmission lines: Introduction, transmission lines equations and solutions, reflection and transmission coefficients, standing waves and SWR, line impedance and line admittance. Smith chart, impedance matching using single stubs, Microwave coaxial connectors. 16 Hours

UNIT-III
Microwave waveguides and Components: Introduction, rectangular waveguides, circular waveguides, microwave cavities, microwave hybrid circuits, directional couplers, circulators and isolators. 16 Hours

UNIT-IV
Microwave Diodes: Transfer electron devices: Introduction, GUNN effect diodes – GaAs diode, RWH theory, Modes of operation, Avalanche transit time devices: READ diode, IMPATT diode, BARITT diode, Parametric amplifiers Other diodes: PIN diodes, Schottky barrier diodes. 16 Hours

Reference Books:

1. Microwave Devices and circuits- Liao / Pearson Education.

Practical HCP 3.1
Practical HCP 3.2
Practical SCP 3.1
Practical SCP 3.2
FOURTH SEMESTER

HCT 4.1: Microcontrollers and Interfacing

Preamble:
This paper helps in understanding the architecture, instructions and programming of many useful microcontrollers being used for many industries applications. The architecture of Pic microcontrollers, programming and interfacing technique is also explained. The study of this paper helps in developing many embedded microcontroller based systems.

UNIT-I
Introduction to Microcontrollers: Microcontrollers and microprocessors, embedded versus external memory devices, 8 bit and 16 bit microcontrollers, CISC and RISC processors, 8051 microcontrollers – MCS-51 architecture, registers in MCS – 51, 8051 pin description, pin connections, parallel I/O ports and memory organization.

UNIT-II
Programming 8051 Microcontroller: 8051 addressing modes, instruction set, assembly language programming tools, development systems and tools. Interrupts in MCS – 51, timers and counters, serial communication.

UNIT-III
Design with Atmel Microcontrollers: Atmel Microcontrollers, architectural overview of Atmel 89C51 and Atmel 89C2051, pin description of 89C51 and 89C2051, using flash memory devices, Atmel 89CXX and 89C20XX, power saving option. Applications – waveform generation – sine, square, ramp and staircase.

UNIT-IV
PIC Microcontrollers: Overview and features, PIC 16C6X/7X, PIC reset actions, oscillator connection, memory organization, PIC 16CX/7X instructions, addressing modes, I/O ports, interrupts, PIC 16C61/71 timer and A/D converter. Interfacing and industrial applications of microcontrollers – Interfacing of keyboard, 7-segment LED, LCD, ADC and DAC.

Reference books:

HCT 4.2: Microwave Electronics and Applications

Preamble:
This paper deals with microwave electronics and applications. Unit I is intended to study Radar and its advantages/disadvantages, civil, military applications in detail. Unit II & III are describing about the concept of satellite communication and study of satellites and special purpose of satellites such as DBS, INMARSAT, INTELSAT, INSAT and SARSAT etc. The detailed studies of this paper enable the students to pursue their higher studies and get
absorbed themselves as employees in Industry/Academic Institutions.

UNIT-I
Radar: Introduction, Radar block diagram and operation, radar equation, factors affecting range of radar, maximum unambiguous range, pulse radar system, radar display, scanning and tracking with radar, Doppler effect, CW Doppler radar, MTI, frequency modulated CW radar and radar antennas. 16 Hours

UNIT-II
Satellite communication: Introduction, Kepler’s laws, orbits, geostationary orbits, power systems, attitude control, station keeping, uplink and downlink budget calculations. 16 Hours

UNIT-III
Special purpose communication satellites: DBS, INMARSAT, INTELSAT, date broadcast satellites (VSATs), mobile satellite communication (MSAT), SARSAT, GPS. 16 Hours

UNIT-IV
Introduction to wireless communication systems: Evolution of mobile radio communication, Mobile radio telephony, mobile radio system around the world, examples of wireless communication systems, paging systems, cordless telephone systems, cellular telephone systems, comparison of common wireless communication systems. Trends in cellular radio and personal communications systems. 16 Hours

Reference books:
5) B. C. Agrawal: Satellite Communications, Khanna Pubs.
7) M. Kulkarni: Microwave and radar engineering, Umesh Pub.

SCT 4.1: Digital Signal Processing

Credit: 4

Preamble:
For many signals with extremely wide bandwidths, real-time processing is a requirement. Digital signal processing is the proper solution for all types of signal processing problems. This paper deals with signals in discrete-time form, which is widely used in a discrete-time system. The characterization and analysis of linear time-invariant discrete-time systems and discrete-time signals in the time domain, finite-duration impulse response and an infinite-duration impulse response filter are discussed.

UNIT-I
Systems Properties, Convolution, Convolution Properties, Performing Convolutions, Applications of Digital Signal Processing. 16 Hours

UNIT-II
DFT: Introduction, Discrete Fourier Series, Discrete Fourier Transform, DFT Properties, Sampling the DTFT, Linear Convolution Using the DFT.

UNIT-III

UNIT-IV
Implementation of Discrete-Time Systems: Introduction, Digital Networks, Structures for FIR Systems-Direct Form, Cascade Form. Linear Phase Filters, Frequency Sampling. Structures for IIR Systems-Direct Form, Cascade Form, Parallel Structure, Transposed Structures. All pass Filters, Lattice Filters- FIR Lattice Filters, All-Pole Lattice Filters, IIR Lattice Filters. 16 Hours

Reference books:

SCT 4.2: Data Structures using C
4 Credits 64 Hours
Preamble: This paper deals with the review of data structures and Pointers. Different recursion programmes, Queues & linked list, sorting & its applications are emphasized in this paper.

UNIT - I
Review of structures and pointers: Storage classes, Command line parameters, Macros, Processor statements, Dynamic Memory Allocation, File handling. The Stack: Definition and examples, representation of stacks in C, Evaluation of postfix expression, Conversion from Infix to Postfix. 16 Hours

UNIT-II
UNIT - III
Queues and Linked Lists: The Queue and its sequential representation linked lists, lists in C and other list structures, Trees: Binary trees, Binary tree representations, Trees and their applications.

UNIT - IV
Sorting: selection sort, bubble sort, Quick sort, Binary tree sorts, Heap sort, Insertion sorts, simple insertion, Radix sort, Searching: Basic search techniques, Algorithmic notation, sequential searching, searching in ordered table, binary search, interpolation search, Tree searching-binary search, tree insertion and deletions, introduction to Hashing.

16 Hours

Reference Books:
3. Robert L Kruse, Data Structures and Programme design using C, PHI.
4. Trembly and Sorenson, Data structures, Tata Mc Graw Hill.

Practical HCP 4.1
Practical HCP 4.2
Practical SCP 4.1
Practical SCP 4.2
Major Project HCMP 4.3

“Learning gives creativity,
Creativity leads to thinking,
Thinking provides knowledge,
Knowledge makes you great”.
- Dr. A.P.J. Abdul Kalam

“Be the change, you want to see in the world”.
- Mahatma Gandhi