Gulbarga University

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

Semester	Code	Title of the Course	Semester Exam	IA	Total	L	T	P	Credits
First		**Hard Core**							
	HCT1.1	Semiconductor and Microwave Devices	80	20	100	4	0	0	4
	HCT 1.2	Electronic Instrumentation	80	20	100	4	0	0	4
	HCT 1.3	Electromagnetics and Antennas	80	20	100	4	0	0	4
		Soft Core (Any One)							
	SCT 1.1	Digital Electronics and 8085 Microprocessor	80	20	100	4	0	0	4
	SCT 1.2	Numerical Analysis	80	20	100	4	0	0	4
		Practical							
	HCP 1.1	Practical HCP 1.1	40	10	50	0	0	2	2
	HCP 1.2	Practical HCP 1.2	40	10	50	0	0	2	2
	HCP 1.3	Practical HCP 1.3	40	10	50	0	0	2	2
		Soft Core (Any One)							
	SCP 1.1	Practical SCP 1.1	40	10	50	0	0	2	2
	SCP 1.2	Practical SCP 1.2	40	10	50	0	0	2	2
		Total for First Semester	**480**	**120**	**600**				**24**
Second		**Hard Core**							
	HCT 2.1	Computer Fundamentals and C Programming	80	20	100	4	0	0	4
	HCT 2.2	8086 Microprocessor and Interfacing	80	20	100	4	0	0	4
		Soft Core (Any One)							
	SCT 2.1	Fiber Optic Communication	80	20	100	4	0	0	4
	SCT 2.2	Analog Control System Design	80	20	100	4	0	0	4
		Open Elective (Any One)							
	OET 2.1	Fundamentals of Electronics	80	20	100	4	0	0	4
	OET 2.2	Basic Electronics	80	20	100	4	0	0	4
		Practical							
	HCP 2.1	Practical HCP 2.1	40	10	50	0	0	2	2
	HCP 2.2	Practical HCP 2.2	40	10	50	0	0	2	2
		Soft Core (Any One)							
	SCP 2.1	Practical SCP 2.1	40	10	50	0	0	2	2
	SCP 2.2	Practical SCP 2.2	40	10	50	0	0	2	2
		Open Elective (Any One)							
	OEP 2.1	Practical OEP 2.1	40	10	50	0	0	2	2
	OEP 2.2	Practical OEP 2.2	40	10	50	0	0	2	2
		Total for Second Semester	**480**	**120**	**600**				**24**
Third		**Hard Core**							
	HCT 3.1	Networks and Systems	80	20	100	4	0	0	4
	HCT 3.2	Microwave Electronics and Measurements	80	20	100	4	0	0	4
		Soft Core (Any One)							
	SCT 3.1	Modern Digital Communication	80	20	100	4	0	0	4
	SCT 3.2	Power and Industrial Electronics	80	20	100	4	0	0	4
		Open Elective (Any One)							
	OET 3.1	Communication and Digital	80	20	100	4	0	0	4

		Electronics							
	OET 3.2	EM Theory and Microwave Devices	80	20	100	4	0	0	4
		Practical							
	HCP 3.1	Practical HCP 3.1	40	10	50	0	0	2	2
	HCP 3.2	Practical HCP 3.2	40	10	50	0	0	2	2
		Soft Core (Any One)							
	SCP 3.1	Practical SCP 3.1	40	10	50	0	0	2	2
	SCP 3.2	Practical SCP 3.2	40	10	50	0	0	2	2
		Open Elective (Any One)							
	OEP 3.1	Practical OEP 3.1	40	10	50	0	0	2	2
	OEP 3.2	Practical OEP 3.2	40	10	50	0	0	2	2
		Total for Third Semester	**480**	**120**	**600**				**24**
Fourth		**Hard Core**							
	HCT 4.1	Microcontrollers and Interfacing	80	20	100	4	0	0	4
	HCT 4.2	Microwave Electronics and Applications	80	20	100	4	0	0	4
		Soft Core (Any One)							
	SCT 4.1	Digital Signal Processing	80	20	100	4	0	0	4
	SCT 4.2	Data Structures using C	80	20	100	4	0	0	4
		Practical							
	HCP 4.1	Practical HCP 4.1	40	10	50	0	0	2	2
	HCP 4.2	Practical HCP 4.2	40	10	50	0	0	2	2
		Soft Core (Any One)							
	SCP 4.1	Practical SCP 4.1	40	10	50	0	0	2	2
	SCP 4.2	Practical SCP 4.2	40	10	50	0	0	2	2
	HCMP 4.3	Major Project (72 Project Evaluation + 48 Viva-voce + 30 IA = 150)	120	30	150	0	0	6	6
		Total for Fourth Semester	**480**	**120**	**600**				**24**

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

HCT 1.1: Semiconductor and Microwave Devices

UNIT-I

Thyristors: Characteristics, thysistor 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 thyristors. Thyristors firing circuits. **12 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. **12 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. **12 hours**

UNIT-IV

Microwave solid state devices: Microwave transistor, MESFETs, 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. **12 hours**

Reference books:

1) M. H. Rashid: Power Electronics, PHI, 1999.
2) P. S. Bimbhra: Power Electronics, Khanna Publication, 1991.
3) S. Y. Liao: Microwave devices and circuits, PHI, 1980.

HCT 1.2: Electronic Instrumentation

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. **12 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 electrode and transducers. **12 hours**

UNIT-III

Electrical conductivity measurement: Conductivity cell, AC electrodynamometer, pH measurements, pH meter. 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. **12 hours**

UNIT-IV

Telemetry and data acquisition system: Introduction, types of data acquisition system, basic elements of data acquisition system, sample and hold circuit. Digital instruments-DFM, DMM, Q meter, lock in amplifier, thickness measurement using LVDT, humidity measurement. Recorders-X-Y recorder, strip chart recorder, magnetic tape recorder. **12 hours**

Reference books:

1) B. C. Nakra and K. K. Choudry: Instumentation, measurement and analysis, TMH, 1995.
2) D. V. S. Murtt: Transducers and instrumentation, PHI, 1995.
3) Rajesh Hongal: DBM PC and clones.

HCT 1.3: Electromagnetics and Antennas

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. **12 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. **12 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. **12 hours**

UNIT – IV

Antenna and arrays: Antenna characteristics, radiation, potential function and EM fields, potential function for sinusoidal oscillator, alternating current element, horn antennas, helical loop antennas. Array of two isotropic sources, principle of pattern multiplication. Array of n-isotropic point sources, principle of pattern multiplication technique, suppression of side lobes. **12 hours**

Reference Books:

1) John D Ryder: Network, lines and fields, 2/e PHI, 2003.
2) E. C. Jorden and K. E. Balmin: Electromagnetic wave and radiating systems, PHI, 1982.
3) S. Y. Liao: Microwave devices and circuits, PHI, 1980.
4) C. A. Balanis: Antenna theory-Analysis and Design, Harper Row, 1982.
5) D. Ganeshrao, B. Somanathnair and Deepa Raghunathan: Antenna and radio propagation, Sanguine Tech. Pub. Bangalore 2007.

SCT1.1: Digital Electronics and 8085 Microprocessor

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. **12 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. **12 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. **12 hours**

UNIT-IV

Peripheral interfacing: Programmable peripheral devices: 8255, 8257, 8259, 8279, 8275, 8237, ADC and DAC. **12 hours**

Reference Books

1) R P Jain: Modern digital electronics, TMH, 3/e, 1996.
2) Taub and Schilling: Digital integrated electronics, TMH, 1992.
3) A P Molvino: Digital principles and applications, TMH, 3/e, 1990.
4) M Rafiquzzaman: Microprocessor and microcomputer based system design, UBS, 1997.
5) R A Gaonkar: Microprocessor: Architecture, Programming and applications, Wiley-Eastern Pub., 1990.
6) D V Hall: Microprocessor and digital systems, TMH, 2/e, 1992.
7) Ayala: 8085 Microprocessor programming and applications, New Age Int., 1995.
8) B.Ram: Fundamental of microprocessor and microcontrollers, Dhanpatrai & sons, 1994.

SCT1.2: Numerical Analysis

UNIT-I

Interpolation and approximation: Language and Newton interpolation, Gregory-Newton interpolations, Hermite interpolation, Newtons general interpolation. **12 hours**

UNIT-II

Numerical differentiation and integration: Numerical differentiation, extra-polation methods, numerical integration, trapezoidal rule, Simpson's $1/3^{rd}$ rule, Newton-Cites integration methods. 12 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. **12 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. **12 hours**

Reference Books

1) S. Balchandra Rao and C K Shanta: Numerical methods with programs in Basic, Fortan & Pascal, Univ. Press, 1992.
2) V. N. Vedamurthy & N Ch S N Iyengar: Numerical methods, UBS PUB., 1998.
3) S S Sastry: Introductory methods of numerical Analysis, 2/e, PHI, 1990.
4) M. K. Jain, SRK Iyenger & R K Jain: Numerical methods-Problem & solutions, Wiley Estern Ltd. 1994.

Practical HCP 1.1

Practical HCP 1.2

Practical HCP 1.3

Practical SCP 1.1

Practical SCP 1.2

HCT 2.1: Computer Fundamentals and C Programming

UNIT-I

Fundamentals of computer: Computer generations and classification, hardware and software requirements, input and output unit, floppy disk, hard disk, compact disk, keyboard, mouse, I/O ports, operating systems, file and directory commands, backup and restoring of files, file attribute and copy commands, automatic file execution. **12 hours**

UNIT-II

C language programming and its applications: An overview of. C, variables ad constants, operators and expressions in C, program control statements, functions in C, declaration of functions, passing values to functions. Arrays in C, initialization, arrays to functions, pointers in C, pointers as addresses, initialization, input & output and disk files in C. **12 hours**

UNIT-III

C programs: C programs for the solution of problems using numerical methods. **12 hours**

UNIT-IV

Introduction to C^{++}: Fundamentals of C^{++}, programming and applications. **12 hours**

Reference Books

1) J C Hayes: Computer Architecture and Organisation, McGraw Hill Tnt..
2) E Balguruswamy: Programming in Ansi C, TMH, 1991.
3) Balguruswamy: Object oriented programming with C^{++}, TMH, 1997.

HCT 2.2: 8086 Microprocessor and Interfacing

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, hard ware interrupts, software interrupts, interrupt vectors used to store pointers, interrupt service routine. **12 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. **12 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. **12 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. **12 hours**

Reference books:

1) D. V. Hall: Microprocessors and interfacing – Programming and hard ware, TMH, 1995.
2) M. Rafiquzzaman: Microprocessors and microcomputer based system design, UBS, 1993.
3) B. B. Brey: The intel microprocessors: 8086/8088, 8186/8188, 80286, 80386, Pentium and Pentium pro-processors, Architecture programming and interfacing, PHI, 1997.
4) K. R. Venugopal and Rajkumar: Microprocessors X86 programming BPB Pub. 1995.

SCT 2.1: Fiber Optic Communication

UNIT-I

Optical fibers: Numerical aperture, launching angles, types of optical fibers, rays and modes, mode theory of circular waveguides, fiber materials. **12 hours**

UNIT-II

Signal degradation: Attenuation, scattering losses, dispersion losses, radiation losses, core and cladding losses, signal distortion, pulse broadening in optical waveguides. **12 hours**

UNIT-III

Optical sources: LEDs, heterostructures, source materials, external quantum efficiency, modulation capability, laser diode, structure, threshold condition, model properties and radiation pattern, modulation of laser diodes, temperature effects. Photo detectors- Physical principles, PIN photo diodes, avalanche photo diodes, photo detector noise, signal to noise ratio, photo diode materials. **12 hours**

UNIT-IV

Optical receiver operation: Fundamental receiver operation, digital signal transmission, error sources, receiver configuration, coherent receiver, digital receiver performance calculation, receiver noise and sensitivity. **12 hours**

Reference Books:

1) Gerd Keisar: Optical fiber communication, Mc Graw Hill, 3/e, 2000.
2) John M. Scnior: Optical fiber communication, PHI, 2/e, 1996.
3) Bishnu P. Pal: Fundamentals of fiber optics in telecommunications and sensor systems, New age Int. 2/e, 1997.
4) Allen H. Cherian: An introduction to optical fiber, McGraw Hill, 1996.

SCT 2.2: Analog Control System Design

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. **12 hours**

UNIT-II

Root locus techniques: Root locus method, angle and magnitude conditions, Root locus plots of first and second order systems. **12 hours**

UNIT-III

Frequency response methods: Steady state solutions of sinusoidal input, Bode plots, Nyquist plots, Nyquist stability criterion. **12 hours**

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. **12 hours**

Reference Books:

1) K Ogata: Modern control engineering, PHI, 3/e 1998.
2) B Kuo: Automatic control systems, PHI, 7/e, 1998.
3) K J Nagrath & M Gopal: Control systems engineering, Wiley Estern, 1985.

OET 2.1: Fundamentals of Electronics

UNIT-I

Circuit Variables: Circuit concepts Units, Standards and Dimensions. Electric current, Electric charge, potential difference, Electric power and Energy. Circuit elements: Passive elements and active elements. Network Law's: Ohm's Law's, Junction Law's (KCL), Mesh Law's (KVL) Application of Network Law's to simple dc networks theorems- Thevenin's theorem, Norton's theorem Max power transfer theorem. **12 hours**

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. **12 hours**

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. **12 hours**

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. **12 hours**

Reference books:

1) D Chattopadhyaya, P.C. Rakshit, B Saha and N N Purkait: Foundations of Electronics, New Age International Edition.
2) D. Roy Choudhary and Shail Jain: Linear Integrated Circuit, New Age International (P) Ltd.
3) p-Amp and Linear Integrated Circuits: R.A. Gaikwad, PHI of India Ltd.
4) A Textbook of Electronics (Second Edition): S.L Kakani and K.C.Bhandari
5) Electronic Principles: A.P. Malvino ,TMH Edition.

OET 2.2: Basic Electronics

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. **12 hours**

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. **12 hours**

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 feed back(Qualitative discussions only), The Barkhausen Criterion for Oscillations, BJT RC phase shift oscillator, Hartley ,Colpitts and crystal oscillator (Qualitative discussions only). **12 hours**

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). **12 hours**

Reference Books:

1) Electronic Devices and Circuits: David. A. Bell; PHI, New Delhi, 2004.
2) Electrical and Electronics & Computer Engineering for Scientists and Engineers Second Edition - K.A. Krishnamurthy & M.R. Raghuveer- New Age International Publishers (Willey Eastern) 2001.
3) Electronic Devices and Circuits: Jacob Millman, Christos C. Halkias, TMH, 1991 Reprint 2001

Practical HCP 2.1

Practical HCP 2.2

Practical SCP 2.1

Practical SCP 2.2

Practical OEP 2.1

Practical OEP 2.2

HCT 3.1: Networks and Systems

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. **12 hours**

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. **12 hours**

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. **12 hours**

UNIT-IV

Time domain and frequency domain analysis: Absolute stability, relative stability and steady state error. Routh's Hurwitz stability criterion. Concept of root locus and Nyquist stability criterion and applications. **12 hours**

Reference books:

1) M. E. Vanvalkenburg: Network analysis, PHI, 1985.
2) D. Roychoudry: Network and System, Wiley Estern, 1889.
3) Umes Sinha: Network analysis and synthesis: Satya Prakash Pub., 1989.
4) M. E. Vanvalkernburg: Introduction to modern network synthesis, Wiley Estern, 1992.
5) K. Ogata: Modern Control Engineering, 2/e, PHI, 1990.

HCT 3.2: Microwave Electronics and Measurements

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. **12 hours**

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. **12 hours**

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. **12 hours**

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. **12 hours**

Reference books:

1) D. M. Pozar: Microwave Engineering, John-Wiley & Sons, 1998.
2) Samuel Y Liao: Microwave Devices Circuits, PHI, 1989.
3) Vincent F Fusco: Microwave Circuits-Analysis and Computer Aided Design, PH Int. 1987.
4) Piter A Rizzi: Microwave Engineering, PHI, New Delhi.

SCT 3.1: Modern Digital Communication

UNIT-I

Digital communication: Introduction, synchronization, asynchronous transmission, probability of bit error in base band transmission. The matched filter optimal terminal filters, bit timing recovery, eye diagrams, digital carried Systems (ASK, FSK, PSK, DPSK, QPSK) , carrier recovery circuits. **12 hours**

UNIT-II

Digital line waveforms: Symbols, binits, bits, bauds, functional notation pulses, line codes and waveforms, M-arry encoding, inter symbol interferences, pulse shaping. Pulse modulation: Introduction: PAM, PCM, PFM, PTM, PPM, PWM **12 hours**

UNIT-III

Base-band shaping for data transmission: Discrete PAM signals, power spectra of discrete PAM signals, Nyquist's criterion for distortion less base-band binary transmission, correlative coding, eye pattern, base band M-ary PAM systems, adaptive equalization for data transmission. **12 hours**

UNIT-IV

Digital modulation technique: Digital modulation formats, Coherent binary modulation techniques, coherent quadrature modulation technique, Non-coherent binary modulation technique, Comparison of binary and quarternary modulation techniques, M-ary, modulation techniques, synchronization and applications. **12 hours**

Reference Books:

1) Simon Haykin: Digital communications, John Wiley, 2003.
2) K. Sam Shanmugham: Digital and analog communication systems, John Wiley, 1996.
3) Simon Haykin: An introducation to analog and digital communication, John Wiley, 2003.
4) D Roddy and J Coolen: Electronics communication, PHI, 4/e, 1995.
5) B P Lathi: Modem digital and analog communication systems, Prism Books, 2/c 1993.

SCT 3.2: Power and Industrial Electronics

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. **12 hours**

UNIT-II

AC voltage controllers: Introduction, principle of ON-OFF control, principle of phase control. Single-phase controllers with resistive and inductive loads, three-phase half-wave controllers. Cycloconvertes single–phase and three-phase cycloconverters. AC voltage controllers with PWM control.

12 hours

UNIT-III

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.

12 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.

12 hours

Reference books:

1) M. H. Rashid: Power Electronics, PHI, 1999.
2) P. S. Bimbhra: power Electronics. Khanna publication, 1991.

OET 3.1: Communication and Digital 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). **12 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)

12 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). **12 hours**

UNIT-IV

Digital circuits: Introduction, Decimal, Binary and Hexa decimal number systems, Conversions, Binary addition and subtraction, OR, AND and NOT Circuits. Boolean algebra, De Morgan's Theorem, additional laws and theorems. NOR and NAND gates. Flip-Flop and RS Flip-Flop using NAND gate. **12 hours**

Reference books:

1) Foundations of Electronics: D. Chattopadhyaya, P.C. Rakshit, B Saha and N N Purkait , New Age International Edition.
2) Electronic Communications: D. Roddy and J. Coolen, PHI of India ltd.,
3) Electronic Communication Systems: G. Kennady, TMH Edition.
4) Electronic Principles: A.P. Malvino, TMH Edition.
5) A Textbook of Electronics (Second Edition): S.L Kakani and K.C.Bhandari.

OET 3.2: 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. **12 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. **12 hours**

UNIT-III

Microwave waveguides and Components: Introduction, rectangular waveguides, circular waveguides, microwave cavities, microwave hybrid circuits, directional couplers, circulators and isolators. **12 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. **12 hours**

Reference Books:

1. Microwave Devices and circuits- Liao / Pearson Education.
2. Introduction to Radar systems-Merrill I Skolnik, 3rd Ed, TMH, 2001.
3. Microwave Engineering – Annapurna Das, Sisir K Das TMH Publication, 2001.
4. Microwave Engineering – David M Pozar, John Wiley, 2e, 2004.
5. J D Kraus, 'Antennas', 2nd Edition, Tata Mc Graw Hill
6. E C Jordan, 'Electro magnetic waves radiating systems', Prentice Hall India,

Practical HCP 3.1

Practical HCP 3.2

Practical SCP 3.1

Practical SCP 3.2

Practical OEP 3.1

Practical OEP 3.2

HCT 4.1: Microcontrollers and Interfacing

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. **12 hours**

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. **12 hours**

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, staircase, pulse width measurement, frequency counter. **12 hours**

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, Optical Rotary shaft encoder, LVDT, angular speed measurement, digital thermometer, load cell. **12 hours**

Reference books:

1) Ajay V. Deshmukh, Microcontrollers: Theory and Applications, Tata McGraw Hill, New Delhi, 2005.
2) M. A. Mazidi and J. G. Mazidi: The 8051 Microcontrollers and Embedded Systems, Pearson Education, Inc. 2002.
3) K. J. Ayala: The 8051 Microcontrollers Architecture, Programming and Applications, 2/e, Penram International Publishing India, Pvt. Ltd., 1996.
4) John B. Peatman: Design with PIC Microcontrollers, Pearson Education, Inc. 1998.

HCT 4.2: Microwave Electronics and Applications

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. **12 hours**

UNIT-II

Satellite communication: Introduction, Kepler's laws, orbits, geostationary orbits, power systems, attitude control, station keeping, uplink and downlink budget calculations. **12 hours**

UNIT-III

Special purpose communication satellites: DBS, INMARSAT, INTELSAT, date broadcast satellites (VSATs), mobile satellite communication (MSAT), SARSAT, GPS. **12 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. **12 hours**

Reference books:

1) Theodurres. Rappaport: Wireless communication-Principles and practice, 2/e Pearson Edn., 2006.
2) M. I. Skolnik: Introduction to radar system, 2/e McGraw Hill, 1990.
3) A. K. Sen and A. B. Bhattacharya: Radar systems and radio aids to navigation, 2/e Khanna Pubs., New Delhi, 1992.
4) Roddy and Coolen: Electronic Communications, 4/e, PHI, 1995.
5) B. C. Agrawal: Satellite communiation Khanna Pubs.
6) A. S. Tabebbaym: Computer Network, 3/e, PHI, 1999.
7) M. Kulkarni: Microwave and radar engineering, Umesh Pub.

SCT 4.1: Digital Signal Processing

UNIT - I

Introduction to digital signal processing: Introduction of common applications of DSP, signal, classification of signals, signal processing systems, advantages of DSP over ASP. Elements of DSP systems. Review of discrete-time signals and systems-introduction, discrete time signals, discrete time systems, convolution of two discrete time signals, correlation of two discrete time signals, sampling of continuous time signals, reconstructions of signals from its sample values. **12 hours**

UNIT – II

The Z transform and discrete Fourier transform: Introduction, definition of Z transform, properties of Z transform, some common Z transform pairs, the inverse Z transform, system function. DFT-Introduction, definition of DFT, properties of DFT, tabulations of properties of DFT, relationship between DFT and Z transform, linear convolution using the DFT. FFT algorithm-introduction, Geortzel algorithm, classification of FFT algorithm, decimation in time FFT algorithm, decimation in frequency in FFT algorithm. **12 hours**

UNIT – III

Realisation of discrete time system : Introduction, computational complexity, memory requirement, finite word length effects in the computations. Network structures for IIR systems-Direct form, transposed form, cascade form and parallel form network structures. Network structures for FIR systems-Direct form cascade form and frequency sampling network structure. **12 hours**

UNIT – IV

Digital filters: Introduction, selection of filter, specification of the frequency response characteristics of the filter, phase response specifications, filter design. Comparison between digital and analog filters. Comparison between IIR and FIR digital filters, notch filters, comb filters, all pass filters and digital oscillators and resonators. **12 hours**

Reference Books:

1) A. V. Oppenheim and R W Schafer: Digital signal processing, PHI, 1975.
2) J. G. Proakis and D. G. Manolkis: Introduction to digital signal processing, Macmillan Pub. Co. 1989.
3) Rabiner and Gold, Digital signal processing, PHI.
4) Farooq Husain, Digital signal processing and applications, Umesh Publication, New Delhi, 2001.

SCT 4.2: Data Structures using C

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**.**

12 hours

UNIT-II

Recursion: Recursive definition and Processes, Recursion in C, Writing recursive programmes, Efficiency of Recursion, GCD, Fibonacci, Tower of Hanoi Problems. **12 hours**

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

12 hours

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. **12 hours**

Reference Books:

1. Yedidyah Langsam, Moshe J Augenstein & Aaron M Tanenbaum, Data Structures using C and C++, 2nd edition, PHI, 1997.
2. E. Balaguruswamy, Programming in ANSI C, 2nd edition, Tata Mc Graw Hill, 1998.
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