

TEACHING AND EXAMINATION SCHEME
Second B.E. Electronics and Communication Engineering, 2015

		Units	Credits*	L	T/P	Exam. Hours	Marks
Third Semester							
<i>A. Written Papers</i>							
Ma 201 A	Advanced Engineering Mathematics (EC) – I	1/2	3	2	-	3	50
EC 202 A	Network Theory (EC)	1/2	3	2	1	3	50
EC 207 A	Solid State Electronics & Devices (EC)	1	3	3	1	3	50
EC 204 A	Electronic Circuits (EC) - I	1	3	3	1	3	50
EC 205 A	Digital Electronics (EC) - I	1	3	3	1	3	50
EC 206 A	Electronic Instruments and Measurements (EC)	1/2	3	2	1	3	50
Total		4.5	18	15	5		300
<i>B. Practicals and Sessionals</i>							
EC 211 B	Network Laboratory (EC)	-	-	-	2		50
EC 212 B	Electronic Instruments and Measurements Laboratory (EC)	-	-	-	2		50
EC 213 B	Electronic Circuits Laboratory (EC) - I	-	-	-	2		50
EC 214 B	Digital Electronics Laboratory (EC) - I	-	-	-	2		50
EC 215 B	Logic System Design (EC) - I	1/2	2	-	2		50
EC 216 B	Computer Programming (EC)	1	2	-	2		50
Total		1.5	4	-	12		300
Total of III Semester		6	22	15	17		600
Fourth Semester							
<i>A. Written Papers</i>							
Ma 251 A	Advanced Engineering Mathematics (EC) – II	1/2	3	2	-	3	50
EC 252 A	RF Circuits and systems (EC)	1	4	3	1	3	50
EC 253 A	Communication Engineering (EC)	1	3	2	1	3	50
EC 254 A	Electronic Circuits (EC) - II	1	4	3	1	3	50
EC 255 A	Digital Electronics (EC) - II	1	3	2	1	3	50
EC 257 A	Industrial Electronics (EC)	1	4	3	1	3	50
Total		5.5	21	15	5		300
<i>B. Practicals and Sessionals</i>							
EC 261 B	RF Circuits Laboratory (EC)	-	-	-	2		50
EC 262 B	Communication Laboratory (EC)	-	-	-	2		50
EC 263 B	Electronic Circuits Laboratory (EC) - II	-	-	-	2		50
EC 264 B	Digital Electronics Laboratory (EC) - II	-	-	-	2		50
EC 265 B	Logic System Design (EC) - II	1/2	3	-	2		50
EC 267 B	Industrial Electronics Laboratory (EC)	-	-	-	2		50
Total		1/2	3	-	12		300
Total of IV Semester		6	24	15	17		600
Joint award for III and IV Semester (Marks not counted for award of division)							
FE 237E	Co-curricular activities	1/2	2				100
* It includes Theory & Practicals/Sessionals of the subject							

TEACHING AND EXAMINATION SCHEME
Third B.E. Electronics and Communication Engineering, 2016

		Units	Credits*	L	T/P	Exam. Hours	Marks
Fifth Semester							
<i>A. Written Papers</i>							
EC 301 A	Feed Back Systems (EC)	1/2	2	3	1	3	50
EC 307 A	Audio Acoustic Systems (EC)	1	4	2	1	3	50
EC 309 A	Computer Organisation (EC)	1	4	2	1	3	50
EC 304 A	Analog Communication Engineering (EC)	1	4	3	1	3	50
EC 310 A	Radiation & Wave propagation (EC) - I	1/2	4	3	1	3	50
EC 306 A	Theory and Applications of Integrated Circuits (EC)	1	4	3	1	3	50
Total		5	22	16	6		300
<i>B. Practicals and Sessionals</i>							
EC 317 B	Audio Electronics Laboratory (EC)	-	-	-	2		50
EC 313 B	Analog Communication Laboratory (EC)	-	-	-	2		50
EC 314 B	Radiation & Wave Propagation Laboratory (EC) - I	-	-	-	2		50
EC 315 B	Integrated Circuits Laboratory (EC)	-	-	-	2		50
EC 316 B	Electronics Workshop (EC)	1	2	-	2		100
Total		1	2	-	10		300
Total of V Semester		6	24	16	16		600
Sixth Semester							
<i>A. Written Papers</i>							
EC 357 A	Video Electronics (EC)	1	4	2	1	3	50
EC 352 A	Electronic Measurement (EC)	1	4	3	1	3	50
EC 353 A	Digital Communication System (EC)	1	4	3	1	3	75
EC 358 A	Microprocessors and Microcomputers (EC)	1	4	3	1	3	75
EC 355 A	Control Theory (EC)	1/2	2	3	1	3	50
EC 356 A	Radiation and Wave Propagation (EC) - II	1/2	4	2	1	3	50
Total		5	22	16	6		350
<i>B. Practicals and Sessionals</i>							
EC 367 B	Television Engineering Laboratory (EC)	-	-	-	2		50
EC 362 B	Electronics Measurement Laboratory (EC)	-	-	-	2		50
EC 363 B	Digital Communication Laboratory (EC)	-	-	-	2		50
EC 364 B	Microprocessor Laboratory (EC)	-	-	-	2		50
EC 365 B	Radiation and Wave Propagation Laboratory (EC) - II	-	-	-	2		50
Total				-	10		250
Total of VI semester		5	22	16	16		600
Joint award for V and VI Semester (Marks not counted for award of division)							
FE 337E	Co-curricular activities	1/2	2				100
* It includes Theory & Practicals/Sessionals of the subject							

TEACHING AND EXAMINATION SCHEME
Final B.E. Electronics and Communication Engineering, 2017

		Units	Credits*	L	T/P	Exam. Hours	Marks
Seventh Semester							
<i>A. Written Papers</i>							
EC 402 A	Telematics (EC)	1/2	4	3	1	3	50
EC 403 A	Advance Communication Systems (EC)	1/2	5	3	1	3	50
EC 407 A	Radar and Navigational Aids (EC)	1/2	4	3	1	3	50
EC 404 A	Advance Computer Technology (EC)	1/2	5	3	1	3	50
EC 408 A	Engineering Management and Economics (EC)	1	2	3	-	3	50
	Elective - I	1	5	3	1	3	50
	Total	4	25	18	5		300
<i>B. Practicals and Sessionals</i>							
EC 412 B	Telematics Laboratory (EC)	-	-	-	2		50
EC 413 B	Advance Communication Systems Laboratory (EC)	-	-	-	2		50
EC 414 B	Computer Laboratory (EC)	-	-	-	2		50
EC 415 B	Project	3/4	-	-	2		
EC 416 B	Seminar	1/2	1	-	1		100
	Total	1.25	1	-	9		250
	Total of VII Semester	5.25	26	18	14		550
Eighth Semester							
<i>A. Written Papers</i>							
EC 459 A	Microwave Engineering (EC)	1/2	4	3	1	3	50
EC 451 A	Digital Signal Processing (EC)	1/2	4	2	1	3	50
EC 452 A	Electronics Instrumentation (EC)	1/2	4	2	1	3	50
EC 457 A	Mobile Communication (EC)	1/2	3	3	1	3	50
EC 458 A	Computer Communication and Data Networks (EC)	1/2	3	3	1	3	50
	Elective - II	1	4	3	1	3	50
	Total	3.5	22	16	6		300
<i>B. Practicals and Sessionals</i>							
EC 463 B	Microwave Laboratory (EC)	-	-	-	2		50
EC 461 B	DSP Laboratory (EC)	-	-	-	2		50
EC 465 B	Computer Communication and Data Networks Laboratory (EC)	-	-	-	2		50
EC 462 B	Instrumentation Laboratory (EC)	-	-	-	2		50
EC 415 B	Project (EC)	1	6	-	2		150
	Total	1	6	-	10		350
EC 464 C	Practical Training (EC)	1	3	-	-		75
EC 465 C	Educational Tour (EC)	1/4	1	-	-		25
	Total of VIII Semester	5.75	32	16	16		750
	Joint award for VII and VIII Semester (Marks not counted for award of division)						
FE 437E	Co-curricular activities	1/2	2				100
	* It includes Theory & Practicals/Sessionals of the subject						

List of Electives:

EC 481 A	Medical Electronics (EC)
EC 482 A	Design Principles of Communication Systems (Ec)
EC 484 A	Solid State and IC Technology (Ec)
EC 485 A	Computer and Microprocessor Control of Industrial Processes (Ec)
EC 487 A	Entrepreneurship Development (Ec)
EC 488 A	Reliability and Maintainability of Electronic Systems (Ec)
EC 489 A	Robotics Engineering (Ec)

SECOND B.E. EXAMINATION**THIRD SEMESTER****Ma 201 A - ADVANCED ENGINEERING MATHEMATICS (EC) - I**

2L

3 Hours, 50 Marks

Differential Equations: Simultaneous differential equations, Total differential equation, Partial differential equation of the first order (Langrange's and Charpit's methods), Linear partial differential equations with constant coefficients.

Partial differential equations of the second order; classification, Monge's methods. Solution of Wave, Heat One dimensions and Laplace equations (two dimensional) by separation of variables method.

Complex Analysis: Analytic functions, complex integration, Cauchy's integral theorem, Cauchy's integral formula. Taylor's and Laurent's theorems. Singularities of an analytic function, Pole; Residue, Cauchy residue theorem. Use of calculus residues to evaluate integrals of the types $\int_{-\infty}^{+\infty} f(x)dx$ and $\int_0^{2\pi} f(x)dx$. Conformal and bilinear transformations.

Vector Calculus: Definitions of Gradient, divergence and curl. Various identities involving them. Green, Gauss and Stoke's theorems(statement and verification only).

Calculus of Variation: Classical problems, Euler-Langrange equations, Isopermetric problem.

Statistics: Concept of probability, Binomial, Poisson and normal distributions. Coefficient of correlation and lines of regression.

EC 202 A - NETWORK THEORY (EC)

2L, IT

3 Hours, 50 Marks

Network Equations: Topology incidence, cut-set end tie-set matrices. Mesh and nodal analysis of networks with independent and dependent sources. Duality, Transient and steady state solutions of D.C. and A.C. networks.

Network Theorems: Superposition, Thevenin, Norton, Reciprocity. Maximum power transfer. Millman and Tellegen's Theorems and their applications to D.C. and A.C. circuits

Resonance: Resonance in series and parallel- circuits. Q-Factor, bandwidth and selectivity.

Non-sinusoidal Periodic Waveforms: Fourier series- trigonometric and exponential forms. Response of network to non-sinusoidal periodic waveforms.

Two Port Networks: Different two port parameters and their inter-relations and characteristic functions, interconnection of two port networks, Brune's test. Network configurations. Symmetrical and asymmetrical two port communication networks. Iterative, Image and characteristic impedances, Propagation, attenuation, phase and Image transfer constants. Balanced, unbalanced and reciprocal networks; T.L. lattice and bridged T network

Network Functions: Generalized concept of complex frequency, Impedance and admittance functions. Exponential excitation and system functions. Driving point and transfer functions. Pole zero configuration of system functions.

EC 207 A - SOLID STATE ELECTRONICS AND DEVICES (EC)

3L, 1T

3 Hours, 50 Marks

Quantum Mechanics: Review of Schrodinger wave equation. Physical interpretation of wave function, Maxwell Boltzmann, Bose-Einstein and Fermi-Dirac statistics. Interatomic forces and types of bonding. Theory of band structure and electronic states in conductors, semi-conductors and insulators. Fermi level

Semi-conductor Physics: Conduction mechanism in semiconductors. Concept of mobility and diffusion. Concentration of carriers and ionized impurities in non-degenerate semi-conductors. Evaluation of Fermi level. Concept of effective electron mass and hole mass. Carrier transport mechanism in semi-conductors. Drift and diffusion currents in non-degenerate semi-conductors. Thermal equilibrium and non-equilibrium conditions. Carrier recombination, continuity equation and time dependent diffusion equation. Surface states and surface recombination. Carrier life time, Photo conductivity. Introduction to optical absorption, photo luminescence. Cathode luminescence and electro luminescence.

Introduction to Solid State Devices: Space charge region and junction capacitance. Minority carrier injection, carrier storage and transient response. Impact ionization and avalanche break-down.

Analytical theory of junction diodes. BJT, JFET, MOSFET, UJT, diffused transistors, avalanche transistors. Degenerate semi-conductors and theory of tunneling, Theory of tunnel diodes, zener diodes, varactor diodes, photo diodes, LEDs, photo-transistors, photo FETs and LASER. Introduction to Laser. Elementary theory of composite junction. Ohmic junctions and hetero junctions.

EC 204 A - ELECTRONIC CIRCUITS (EC) - I

3L, 1T

3 Hours, 50 Marks

Introduction: Biasing and stabilization techniques of BJT, JFET, MOSFET for use as amplifiers in various configurations. Small signal models for BJT, JFET and MOSFET in discrete and integrated form. Frequency dependence characterization and equivalent circuits. Miller effect.

Untuned small signal BJT amplifiers: Analysis and design of Single stage and multistage. RC coupled and transformer coupled amplifiers. Frequency response, bandwidth, gain and factors affecting them. Various two transistor integrated circuit amplifier stages. Introduction of d.c. amplifiers, differential amplifiers, Cascode and Darlington circuits. Follower circuits and boot-strapping.

Feedback amplifiers: Study of the effects of feedback on amplifier gain, distortion, noise, band-width and impedance levels, Regeneration and its control in multistage audio frequency amplifiers

EC 205 A - DIGITAL ELECTRONICS (EC) - I

3L, IT

3 Hours, 50 Marks

Device Characteristics: Steady state and transient switching characteristics of diodes, BJTs, FETs, UJTs. Wave shaping circuits. Integrating and differentiating circuits, effects of time constant, relation of tilt time to time constants. Clipper and clamper circuits using diodes and transistors. Saturated and unsaturated transistor switches. Speed-up capacitors. Inverter circuits. Performance of pulse transformer and lumped distributed parameter electromagnetic delay lines.

Relaxation Oscillators: Theory, operation and performance of astable, monostable and bistable multivibrators. Different triggering circuits. Theory of Schmitt trigger. Comparison of performance of various circuit configurations of multivibrators and their fields of applications. Tunnel diode. UJT relaxation oscillator. Theory of astable and monostable blocking oscillators and their triggering methods.

Sweep Circuits: Free running and triggered modes. Theory and common circuits of voltage and current time base generators.

Sampling Gates: Theory, operation and applications of unidirectional and bi-directional sampling gates using diodes and transistors.

EC 206 A - ELECTRONIC INSTRUMENTS AND MEASUREMENTS (EC)

2L, IT

3 Hours, 50 Marks

Introduction: Difference in measurements at low and high frequencies. Types of indicating instruments, balance detectors and other auxiliary apparatus used. Shielding and grounding considerations. Noise problems. Effects of physical size of components.

Characteristics of Lumped passive components: Measurement of resistance, capacitance, self and mutual inductance and incremental inductance at audio and radio frequencies. Price's guard wire and loss of charge methods for resistance measurement. Important a.c. bridges for capacitance and inductance measurements. Introduction to inductively coupled ratio arm bridge. Special considerations for radio frequency bridges. Twin-T and bridged-T networks. Resonance and heterodyne methods of parameter measurement. Q-measurements. Q-meter.

Instrument Amplifiers: Operation, performance and characteristics of single ended, differential, chopper stabilized amplifiers used in Instrumentation, Different types of choppers and their characteristics .

Electronic Analog Voltmeters: Characteristic and specification of analog electronic voltmeters of different kinds, Circuits of dc. volt meters using tubes, FETs, BJTs, and ICs, Analysis of circuits with various instrument amplifiers, configurations to compare sensitivity, stability, linearity and impedance characteristics. Theory of operation and circuits for average, peak, peak to peak and RMS responding-A.C., Voltmeters, Use of compensated multipliers, CMRR and NMRR, R.F. Voltmeters. Common types of voltmeter probes. Electronic VOM.

Electronic Analog Ammeters: Performance-specifications of instruments for audio and radio frequency current measurements. Rectifier and thermocouple ammeters. Principle of Hall effect ammeters. Use of amplifier type d.c. voltmeter as ammeter.

EC 215 B - LOGIC SYSTEM DESIGN (EC) - I

2T

50 Marks

Number systems: Binary arithmetic, Octal and hexadecimal number systems. Different numerical and alphanumeric codes. Truth functions

Basic Logic Circuits: Positive and negative logic of OR, AND, NOT, NOR, NAND, Exclusive OR and Exclusive NOR gates. RTL, DTL, DCTL, TTL, ECL, MOS and CMOS logic circuits and their realization. Power dissipation, speed, delays, noise margin, fan-in and fan-out capabilities.

Combinational Logic: Boolean algebra. Boolean functions and expressions. Simplification and minimization techniques, K-map and tabular methods. Design of minimal combinational systems and realization. Design of multiple output combinational systems. Design of hazard free combinational system.

Flip-Flops: Unclocked and clocked flip-flops. R-S, D, J-K and T flip-flops. Master-slave and edge-triggered flip-flops. Specifying parameters and timing properties of flip flops .

Ma 211 A Special Mathematics (C,CSE,E,EC,M,Mi&PI)
(Common for Diploma passed candidates of all branches)

2L

3 Hours, 50 Marks

Differential Calculus: Asymptotes, curvature. Envelopes, evolutes, Concavity, Convexity and singular points, curve tracing

Integral Calculus: Rectification and quadrature. Volumes and surfaces of Solids of revolution. Mean values of functions, differentiation under sign of integration

Differential Equations: Differential Equations of the first order but not of the first degree. Linear differential equations with constant coefficients. Homogeneous Linear differential equations, second order differential equations with variable coefficients

FOURTH SEMESTER

Ma 251 A - ADVANCED ENGINEERING MATHEMATICS (EC) - II

2L

3 Hours, 50 Marks

Integral transforms: Laplace transform, various theorems. Inverse Laplace transform, Applications to solutions of ordinary and simultaneous differential equations. Infinite Fourier transform, various theorems and application to solution of first order partial differential equation.

Special Functions; Solutions of Bessel and Legendre's differential equations, Bessel function and Legendre polynomial of first kind. Their generating functions, recurrence relations, orthogonality, Rodrigue's formulae, and other properties. Solution of Hypergeometric differential equation, Gauss hypergeometric function, its integral representation. Gauss summation theorem, their transformations.

Numerical Methods: Newton-Gregory formula, Langrange's method, Gauss backward, Gauss forward, Stirling's methods for interpolation. Newton-Gregory, Stirling methods for numerical differentiation. Trapezoidal and Simpsons 1/3 and 3/8 rule for numerical integration. Numerical solution of ordinary differential equations of first and second order by Euler, Taylor, Milne's, Runge-Kutta methods. Bisection, Reguli-faisi, secant, Newton-Raphson methods for solution of algebraic and transcendental equations. Matrix representation of simultaneous equations. Gauss elimination, Jordan, Jacobi, Gauss-Siedal methods for simultaneous linear algebraic equations.

EC 252 A - RF CIRCUITS AND SYSTMS (EC)

3L, IT

3 Hours, 50 Marks

Coupling Circuits and Impedance Matching Networks: Resistive, capacitive, inductive, mutual inductive and combination type of R.F. couplings. Single and double tuned couplings. Effect of loose, tight and optimum couplings, load conditions and Q. Various impedance matching networks for low and high impedance loads. Balanced-to-unbalanced network.

RF Voltage Amplifiers: Theory, operation, performance and design of R.C. coupled and transformer coupled single and double tuned amplifiers using JFETs, MOSFETs & BJTs. Time and frequency domain analysis. Synchronously tuned multistage amplifiers. Stagger tuned, stagger damped circuits. Neutralization circuits. Cascode amplifiers. Integrated circuit frequency selective R.F. and IF amplifiers

R.F. Power Amplifiers: Special features of R.F. power devices. Theory and design of tuned class C amplifiers using VTs, BJTs, JFETs and MOSFETs. Graphical and approximate analytic methods of solution : Output circuit efficiency considerations. Biasing circuits. Characteristics of driver and output circuit power supplies. Effect of input circuit distortion. Neutralization Parasitic oscillations. Class'C amplifiers, adjustments. Theory of frequency multipliers. Tuned class-B linear amplifiers

Sinusoidal Oscillators: Oscillators with two terminal and four terminal active elements. Criteria for oscillations. Analysis, characteristics and applications of different LC, RC, crystal and negative resistance audio and radio frequency oscillators using. BJTs, FETs and Ics. Linear and non-linear operation of oscillators. Amplitude and frequency stabilization.

EC 253 A - COMMUNICATION ENGINEERING (EC)

2L, 1T

3 Hours, 50 Marks

Introduction: Meaning of Analog and Digital Communication. Concept of base-band and carrier transmission. Introduction to multiplexing.

Line Telegraphy: Telegraphy Codes, Telegraph networks based on automatic exchanges. Signalling methods. Elements of multi-channel VF telegraphy. Teleprinter working. Picture and facisimile telegraphy. Telex services. Introduction to submarine telegraphy.

Line Telephony: Principles of automatic switching. Elements of pannel and crossbar systems of switching signaling methods. Director and non-director exchanges. Principle of STD. Elements of multichannel carrier telephony. Carrier communication over power lines. Traffic and trunking considerations

Line Communication Components: Telegraph and Telephone, transmitters and receivers. Hybrid transformers and line balancing arrangements. Introduction to Communication cables. Loading of lines and cables. Repeaters. Anti side tone circuits. Phantom circuits. Echoes and cross-talks. Interference from neighbouring power circuits

Wave Filters: Design of prototype bandpass, band stop, highpass, low pass, Constant-K. and m-derived filters. Design of composite filters. Impedance matching and impedance transforming filters. Connection of filters in parallel. Frequency dividing networks for audio and carrier systems. Crystal filter-analysis and characteristics of single crystal, T and lattice type of crystal filters. Construction and characteristics of mechanical and ceramic filters. Comparison of different filter types.

Attenuators and Pads: Fixed, continuously variable and step attenuators. Image impedance, insertion loss and interaction factors. Analysis and design of TL, Bridged-T, ladder and lattice types of attenuators.

EC 254 A - ELECTRONIC CIRCUITS (EC) - II

3L,1T

3 Hours, 50 Marks

Untuned large signal amplifiers: Methods of analysis of large signal FET, BJT and IC amplifiers. Analysis of distortion and cross modulation. Classification of power amplifiers. Analysis and design of single ended, parallel and push-pull Class A, AB and B power amplifiers. Complementary, symmetry and quasi-complementary circuits, Driver and out-put stages, with and without out-put transformers for power amplifiers. Output circuit efficiency calculations for various classes and configuration of amplifiers. Power out-put. Thermal considerations. Derating curves.

Power Supply Circuit: Design factors and applications of various power supply filters and voltage multiplying rectifier circuits.

Regulated Power Supplies: Regulator circuits using voltage regulating tubes, solid state devices and monolithic ICS. Adjustable constant voltage power supplies. Adjustable constant current power supplies. Higher output power supplies with solid state pre-regulations. Protection circuits for power supplies. Rating and specifications.

EC 255 A - DIGITAL ELECTRONICS (EC) - II

2L,1T

3 Hours, 50 Marks

Counters and Registers: Binary and decade ripple counters. One bit counters. Up, down and up-down, synchronous counters. Programmable counters. Divide-by N counters. Storage registers, shift-right, shift-left and bi-directional shift registers. Serial input, serial output, parallel input, parallel output, parallel-in-serial out, serial in parallel out and Universal shift registers and synchronous parallel loading of shift registers. Static and dynamic MOS shift registers. Ring and Johnson counters

Arithmetic Circuits: Digital Comparators, half, and full adders; parallel and serial binary adders, half and full binary subtractors. BCD adders and subtractors. Binary multipliers and divider circuits

Miscellaneous Sub-systems: Encoders, decoders and code converters. Parity checking circuits. Multiplexers and demultiplexers. Digital to analog and analog to digital converters.

Semi-conductor memories: Random and sequential access memories. RAM, ROM, PROM, EPROM.EEPROM, EAPROM, EPLA, GALs. MOS and CMOS memories

EC 257 A - INDUSTRIAL ELECTRONICS (EC)

3L, 1T

3 Hours, 50 Marks

Power electronics devices: Characteristics and operation of SCR, PUT, SUS, SBS, SCS, TRIAC, DIAC, IGBT, GTO, MCA and light activated thyristors. Ratings and rating extension by series/parallel operation.

Electronic Power Control: Electronic methods of power control. SCR firing methods, Phase control techniques. Line commutation and different types of commutation. One, two and four quadrant converters. Bridge inverters, series and parallel inverters. Cyclo converters

Electrical Drives: Performance characteristics of series, shunt and compound d.c. motors. Motor starters. Characteristics of single and three phase induction motors, Universal motor, Amplidyne and selsyns.

AC and DC Motor Speed Control: Philosophy of speed control, open and closed control and single and three phase AC, DC and universal motors using thyristors. PWM inverter technique and introduction to variable frequency drive

Misc. Industrial Applications: Photo relays and their applications, X-ray tubes. Particle accelerators. Principle of Electron Microscope, Uninterruptible supplies. Switched mode power supplies

Programmable Logic Controllers (PLC): Advantages of PLC, CPU configurations, Digital and analog inputs and outputs, ladder circuits and process flow diagram. Console and operator panel.

EC 265 B - LOGIC SYSTEM DESIGN (EC) - II

2T

50 Marks

Sequential Logic: Storage devices and sequential sub-systems. Introduction to synchronous and asynchronous sequential systems. Mealey and Moore circuits. Cost vs. speed.

Synchronous Sequential Systems: Introductory examples. The finite state model – basic definition. Memory elements and their excitation functions. Synthesis of synchronous sequential circuits. Analysis and design of synchronous sequential circuits. State assignment and reduction technique. Introduction to threshold logic and relay circuits

Asynchronous Sequential Systems: Fundamental mode circuits, Analysis procedure. Circuits with latches. State assignment in Asynchronous sequential circuits. Design of pulse mode asynchronous sequential circuits. Problems in asynchronous circuits – Races and Hazards.

Ma 261 A Special Mathematics (C,CSE,E,EC,M,Mi&PI)

(Common for Diploma passed candidates of all branches)

2L

3 Hours, 50 Marks

Statics: Composition and resolution of coplanar forces Moments. Equilibrium of coplanar forces acting at a point, Equilibrium of three forces acting on a rigid body. Resultant and equilibrium of coplanar forces acting on a rigid body friction. Common catenary.

Dynamics: Composition and resolution of velocities and accelerations. Relative velocity. Rectilinear motion, linear constant acceleration. Vertical motion under gravity. Rectilinear motion under variable law offers and also in resisting medium. Kinematics of uniplaner motion

THIRD B.E. EXAMINATION

FIFTH SEMESTER

EC 301 A - FEEDBACK SYSTEMS (EC)

3L, IT

3 Hours, 50 Mark

System Response: Steady state response to DC and periodic functions by pole zero plots. Natural frequencies of networks and transient response. Direct and logarithmic plots of response functions. Magnitude and phase from s-plane vectors. Response of linear systems to singularity functions like impulse, step, ramp, parabolic and combination thereof .

Introduction of feedback systems: Open loop and closed loop systems. Mathematical models and electrical analogy for physical systems. Transfer function analysis. Transfer functions for BJT and FET amplifiers with and without feedback.

Control components: Constructional characteristics and transfer functions for servo component such as DC and AC servo motors, synchros and resolvers. Linear scales and rotary incremental and absolute optical encoders

Graphical representation: Block diagram, signal flow graphs, reduction techniques and gain formulae. Application of signal flow graphs for the analysis of passive and active networks and closed loop systems

EC 307 A - AUDIO ACOUSTIC SYSTEMS (EC)

2L,1T

3 Hours, 50 Marks

Introduction: Monaural, binaural, monophonic, stereophonic and quadraphonic audio system descriptions

Electro Acoustic Components: Construction and characteristics of different types of direct radiator and horn loudspeaker and different types of microphones. High-fidelity speaker systems.

Audio Recording: Single and Multi-channel magnetic tape sound recording and reproducing processing. Biasing and equalisation. Type of recording heads. Tape transport mechanism. Principles of stereo disc phonograph recording. Compact disc recording and reproduction.

Motion Picture Sound Systems: Variable area and variable density methods of film sound recording and reproduction.

Audio Measurements: Concept of anechoic chamber. Sound level meter, Audiometer. Measurement of characteristics of Loudspeakers and microphones. Reverberation measurements.

Audio Circuits: Audio Lines and impedance matching provisions. Multiple speaker connections. Volume and tone control circuit. Bass and Treble filters. General considerations for public address system and inter-communication units.

EC 309 A - COMPUTER ORGANISATION (EC)

2L, IT

3 Hours, 50 Marks

Elements of Computer Organisation

Evolution of Computers: Generations of Computers, Modeling of computers at Gates, Registers and Processors level.

CPU Architecture: Fixed and floating point arithmetic and ALU organization. Instruction format, types, sequencing and interpretation. Instruction fetch and execute cycles. Addressing techniques. Hardwired and Micro-programmed control

Secondary Memories: Magnetic memories core, tape, disk and floppy disc. Introduction to Magnetic Bubbles and CCD memories

I/O Devices: Principle and construction of Keyboard, Mouse, digitizer, joystick, optical scanner, Resistive membrane touch screen, Tele-typewriter, CRT terminals, TFT monitors, Line, Dot Matrix, Daisy wheel, Ink jet and Laser printers.

Communication of I/O with CPU and Memory: Speed mismatch of I/O v/s memory and CPU. Communication methods for I/O to CPU and Memory : Polling, interrupt, DMA and I/O channel.

EC 304 A - ANALOG COMMUNICATION ENGINEERING (EC)

3L, IT

3 Hours, 50 Marks

Amplitude Modulation: Analysis of standard AM waves and signal power distribution. Different circuits for amplitude modulation and their comparison. Methods of generating DSBSC SSB and VSB AM and their characteristics. Envelope and coherent demodulation methods for standard AM, DSB-SC, SSB signals. Design considerations of AM modulators and demodulators. Frequency Division Multiplexing.

Angle Modulation: Theory of frequency and phase modulations. Spectrum and BW of FM and PM signals. Direct and indirect methods of generating narrow-band and wide-band FM. Discriminators and PLL demodulators for FM and PM. Pre-emphasis and de-emphasis. Idea of noise suppression properties of FM and PM systems.

Radio Broadcast Transmitters: Characteristics of master oscillators, buffers and frequency multipliers for AM & FM broadcast transmitters. Feeder lines. AM and FM transmitter stability considerations. Broadcast studio equipment and control room apparatus. Stereophonic broadcast considerations.

Radio Receivers: TRF and superheterodyne receivers, Selection of frequency converters, mixers and local oscillators, Characteristics of IF and RF amplifiers. Double spotting. Electrical and Electronic tuning and tracking. Automatic gain and frequency control. Tone control. Band spread. Sensitivity, selectivity, fidelity and noise performance of receivers. Diversity reception. Receiver testing. Special considerations in communication receivers. Double conversion, delayed AGC, noise-limiter and squelch. Operation of AM and FM receivers and their comparison, Introduction to stereo FM receivers.

Pulse Modulation: Uniform sampling theorem, Generation of PAM, PDM and PPM, signals and methods of reconstitution of original signal from its samples. Bandwidth requirements and comparison. Time division multiplexing.

EC 310 A - RADIATION & WAVE PROPAGATION (EC) – I

3L, IT

3 Hours, 50 Marks

Transmission Lines: Types of transmission lines. General transmission line equations. Line constants and equivalent circuits. Infinite line, Lines with reflections. SWR Lines, dissipationless lines. Cable circuits and composite lines.

Coaxial cables. Transmission lines at audio and radio frequencies. Losses in transmission lines. Transmission equalizers. Characteristics of quarter wave, half wave and other lengths. Smith chart and its applications. Transmission line applications. Stub matching

Radio Wave Propagation: Mechanism of radio wave propagation, Reflection, refraction interference and diffraction of radio waves. Theory of ground wave, space wave and sky wave propagation. Effect of conductivity, dielectric constant, curvature and surface imperfections of earth on wave propagation, Duct propagation and tropospheric scattering. Characteristics of ionosphere and its effects on wave propagation, critical frequency, skipzone and maximum usable frequency. Multiple hop transmission, oblique and vertical incidence transmission. Effect of earth's magnetic field, solar activity and meteorological conditions on wave propagations.

Coordinate System: Cartesian, Cylindrical and Spherical Coordinate Systems. Vector components and unit vectors in the coordinate systems. Gradient, Divergence and Curl in various coordinate systems.

Electric & Magnetic fields: Electric field intensity, Gauss's law, Divergence theorem. Potential difference & potential. Potential Gradient. Conductor Properties & boundary conditions for conductors. Method of Images. Boundary conditions for perfect Dielectric Materials. Biot-Savart Law, Ampere's Circuital law, Curl, Stoke's theorem. Magnetic flux density, Boundary conditions for Magnetic fields. Vector Magnetic Potential. Faraday's law, Displacement current. Maxwell's equations in point form & Integral form.

EC 306 A - THEORY AND APPLICATIONS OF INTEGRATED CIRCUITS(EC)

3L, 1T

3 Hours, 50 Marks

Introduction: Distinction between characteristics of linear and digital IC's, Biasing consideration in linear IC's. Parasites and their effects in IC's. General performance, differences between discrete circuits and IC versions. Power requirements and power supplies for linear IC's

IC Fabrication: Processing steps for IC Fabrication, Epitaxial growth, surface passivation, photolithography and etching, elements of diffusion processes. Ion implantation & isolation techniques

Operational Amplifiers: Differential amplifier stage. Characteristics and error signals. Stages of operational amplifiers Multistage operational amplifiers. Characteristic of operational amplifier in different configurations. Frequency response and stability considerations of operational amplifier, Compensation in operational amplifiers. Characteristics of wide band operational amplifiers

Applications of Operational Amplifiers: General applications of Op. Amps. in linear and non-linear circuits. Theory and characteristics of Active filters. Applications of Op. Amps. in wave form generators.

Other Linear ICs: Four quadrant multiplier and its simple applications. CMOS multiplexers. Voltage Regulator ICs with feed back current limiting. Positive- and Negative voltage IC regulators

Linear PLL: Basic theory of first, second and higher order loops. Lock-in and Lock-out processes. Tracking performance. Noise in linear PLL systems. Important applications of linear PLL. Measuring PLL parameters.

SIXTH SEMESTER

EC 357 A - VIDEO ELECTRONICS (EC)

2L, 1T

3 Hours, 50 Marks

Introduction: Scanning and synchronizing. Analysis of composite video signals. Common standards of Television

Television Transmission: Colour TV cameras, Picture carrier, sound carrier and colour carrier signals. Encoding the picture information, Chrominance modulation. Color resolution. Compatibility of Monochrome and colour systems. Block diagrams of colour TV transmitters and functions of each part.

Television Reception: Types of monochrome and color picture tubes Decoding the picture information. Functional block diagrams of Monochrome and colour TV receivers. Raster, sync, and AGC circuits. R.F. alignment.

Video Systems: Principle of working of video tape recorders and disc players. Common standards. Introduction to MPEG digital recording.

EC 352 A - ELECTRONIC MEASUREMENT (EC)

3L, 1T

3 Hours, 50 Marks

Power Measurements: Power measurements at audio and radio frequencies. Absorption, calorimetric and transmission power meters. Electronic wattmeters.

Waveform Display Instruments and Recorders: Cathode ray Oscilloscope and its specifications. Cathode ray tube. CRO applications for low and high frequency signals. Characteristics of CRT amplifiers. Free-running and triggered mode, Synchronisation, Dual-beam and dual trace CRO's. Different sweep modes. Mesh storage and phosphor storage CRT's,. CRO Probes,

Strip chart and X-Y servo recorders.

Frequency and Phase Measurement: Frequency standards, Methods of audio and radio frequency measurements, comparisons by CRO and interpolation methods. Absorption, reaction and transmission wave meters. Dip meters. Heterodyne frequency meters, CRO methods of phase measurements, Direct reading, Phase meters for audio and radio frequencies.

Theory of Errors: Accuracy and precision. Methods of reducing systematic errors in measurements. Statistical analysis of random errors. Normal error curve. Estimation of error in computed results.

Amplifier Measurements: Measurements of modulation depth. Different modulation meters. Distortion analyzers and total distortion meters, Intermodulation method of distortion measurements. Square wave testing of tuned and untuned amplifiers. Testing of Video amplifiers

Noise Measurements: Measurements of noise voltage, noise current, noise power and figure. Brute-force method, Sine-wave method and noise generator method. Common types of noise signal generator.

Special Measurements and Tests: Introduction to Sampling, Vector and Differential Voltmeter, Vector impedance meter, Function generators, RF Signal generators and Pulse generators. Introduction to frequency synthesizers.

Wave Measurements: Various types of wave and spectrum analyser for audio, radio and microwave frequencies. Field strength measurements of radio waves.

EC 353 A - DIGITAL COMMUNICATION SYSTEM (EC)

3L, 1T

3 Hours, 75 Marks

Random signals: Power and energy signals. Introduction to probabilistic and statistical description of discrete and continuous communication processes. Marginal, conditional and joint probability density and distribution functions. Stationarity and ergodicity. Auto correlation and Cross correlation functions. Energy spectral density and Power spectral density. Simple linear system analysis under random excitation in time and frequency domains

Digital communication: Comparison of analog and digital communication systems. Essentials of PCM, linear delta and adaptive delta modulation. Study of components of complete digital communication system. Multiplexing, Introduction to bit, word and frame synchronizations. Important digital carrier modulation methods, Introduction to matched filter detection.

Noise: Various noise sources in amplifiers and communication systems. Comparison of various electronic devices for noise performance. Signal to noise ratio and noise figure. Equivalent noise bandwidth. Noise temperature. Effect of cascading, statistical properties of noise. Representation of white and band pass noise in communication systems.

System Performance: Noise-performance of analog CW and pulse modulation systems using coherent and non-coherent detection. Baseband PCM and delta modulation systems performance in terms of probability of error and S/N ratio. Probability of error performance of band pass ASK, FSK, BPSK, QPSK, and simple QAM systems

EC 358 A - MICROPROCESSORS AND MICROCOMPUTERS (EC)

3L, 1T

3 Hours, 75 Marks

Microprocessor Architecture: Architecture of 8-bit 8085, Z80, 6800 Microprocessors; their instruction sets and addressing modes. Assembly language programming of Intel's 8085 Microprocessor. Introduction to assemblers.

Microprocessor interfacing: Interfacing of address, data and control buses, Memory and I/O devices, Interrupt and DMA for 8085 microprocessor.

Introduction of Microcontrollers: Architecture and instruction set of MCS-51 series of microcontrollers. Application of Microcontrollers.

16 and 32-bit Microprocessors: CPU architecture, addressing modes and features of 16 and 32 bit microprocessors – 8086. Salient features of 80286, 80386, 80486 and Pentium series microprocessors.

Bus standards: Introduction to Multibus, VME, RS-232-C, IEEE 488, PCI, USB, RS 422 and 485.

EC 355 A - CONTROL THEORY (EC)

3L, 1T

3 Hours, 50 Marks

System Performance and Stability: Time and frequency response of control systems. Bode plots. Time and frequency response of multiple feedback amplifiers. Proportional integral and Derivative Control, Time domain and frequency domain specification and their correlation. Steady state error coefficient and error analysis.

System Stability: Stability and oscillations of feedback control systems. Concept of absolute, relative and conditional stabilities. Routh-Hurwitz and Nyquist criteria of stability Gain and phase margins. M and N circles and Nichol's chart Root locus technique and its applications. Concept of BIBO and Asymptotic stabilities. Stability study of FET, BJT and Tube feedback amplifiers and oscillators with the help of Routh-Hurwitz, Nyquist and Root Locus techniques. Introduction to Describing-function technique.

Compensation: Lag, Lead and Lag-Lead compensators Cascade compensation in time and frequency domain. Feed-back compensation techniques.

Introduction to Modern Control Theory: Concepts of state and state variables. State model of simple engineering systems. Relation between transfer function and state model. Solution of State equations for simple linear systems. Meaning of controllability and observability

EC 356 A - RADIATION AND WAVE PROPAGATION (EC) – II

2L, 1T

3 Hours, 50 Marks

Radiation: Retarded potentials and concept of electromagnetic radiation. Alternating current element and power radiated, Radiation resistance. Radiation from dipole and monopole antennas.

Antennas: Quarter wave and half wave antennas. Application of network theorems to antennas. Resonant and non-resonant antennas. Radiation resistance, J impedance, mutual impedance and directional characteristics of antennas. Antennas patterns. Effective length and effective area of antennas, Antenna gain efficiency, beamwidth and polarization. Antenna temperature. Loaded antennas. Colinear, broad-side, endfire and combination arrays and computation of their radiation patterns. Multiplication of radiation patterns. Binomial array, Yagi Rhombic, log periodic antennas and Baluns. Receiving antennas. Antenna systems for diversity reception. Elements of design considerations for medium wave and short wave antennas.

Antenna Measurements: Antenna length, resonance, impedance, gain directivity polarization, phase and radiated power measurements.

FINAL B.E. EXAMINATION

SEVENTH SEMESTER

EC 402 A – TELEMATICS (EC)

3L, IT

3 Hours, 50 Marks

Digital Telephony: Principle of working of SPC digital telephone exchanges. Digital switching, space, time. TS, ST, STS, TST switch blocks. Termination of subscriber lines Signalling systems with digital exchanges. Principle of common channel signalling. Synchronization aspect for digital telephony. Store Program Control for call processing.

Integrated Digital Networks: Data Communication terminology. Introduction to Circuits, message and packet switching concept. Basic aspects of multiplexing, signaling and synchronization in integrated digital networks. Overview of ISDN and BISDN. Concepts of basic rate and primary rate ISDN. Access and facilities provisions. Elements of fast packet switching, frame relay, ATM, SONET and SDH. Introduction to photonic switching.

EC 403 A - ADVANCE COMMUNICATION SYSTEMS (EC)

3L, IT

3 Hours, 50 Marks

Line-of-Sight and Troposcatter Communication: Principle of working and essential features of microwave LOS and troposcatter communication. Propagation study and performance requirements. Diversity techniques.

Satellite Communications: Basic considerations. Up-link and down link parameters. Orbit and frequency selection. Transmission losses, noise and interference. Elements of multiple access techniques. Frequency reuse techniques. Functional description of earth stations

Optical Communications: Ray propagation in optical fibers. Types of fibers. Losses and dispersion in fibers. Transmitter and receiver subsystem for optical communications. Laser and LED sources. Optical Amplifier. Cable joints, couplers and connectors. Splicing techniques. Modulation techniques. PIN and avalanche photo diode detectors. Characteristics of analog and digital transmission in optical communication systems. Noise considerations.

EC 407 A – RADAR AND NAVIGATIONAL AIDS (EC)

3L, IT

3 Hours, 50 Marks

Radar Operation and Performance: Components of radar system Radar performance factors and specifications. Pulse considerations and duty cycle. Equations for monostatic and bistatic radar, Radar cross section and range. Pulse integration. System losses. Radar antenna patterns, phased arrays and interferometer. Duplexer, Radar tracking and scanning. Monopulse, sequential lobing and conical scanning methods. CW, FMCW, MTI, SAR and Pulse doppler radars. Weather radars

Electronic Navigation: Principle of operation of radar direction finder and range system, Loran system, DME and TACAN system. Microwave altimeters, Elements of Microwave remote sensing. Satellite based Global Positioning System.

EC 404 A - ADVANCED COMPUTER TECHNOLOGY (EC)

3L, IT

3 Hours, 50 Marks

Computer Architecture: Microprogrammed control organization, CPU-memory speed mismatch and solutions : Word-length, caches and buffers. Speeding up instruction cycle, instruction fetch and decode overlaps.

Parallelism in execution: Instruction pipe-line and vector processing concepts. Introduction to Array processors.

Memory Organisation: Memory hierarchy. Associative memory. cache memory, Paging and segmentation.

Advanced Systems: Organization of parallel processing, multiprocessing, multiprogramming, distributed processing and time sharing systems.

Software: Introductory theory of Compilers, Interpreters and operating systems.

EC 408 A - ENGINEERING MANAGEMENT AND ECONOMICS (EC)

3L

3 Hours, 50 Marks

Principles and Techniques of Management: Management function. Theories of management and their application to Indian condition. Responsibility, authority, leadership, motivation, co-ordination and co-operation. Change agent, Importance of organisation charts and their application to Electronic Industries

Financial Management: Objectives, functions and importance of financial management, Book-keeping, journals and ledgers, Balance sheet, profit and loss accounts, fund flows and financial ratios. Sources of finance and Financial Institutions. Interest and depreciation. Salvage value

Marketing Management: Concept of marketing and its various components

Stores and Purchase Management: Function of store and Purchase management. Economic order quantity. A-B-C analysis. Inventory control and management. Purchase procedure in Government, Public and Private undertakings, Floating of tenders and Contracts.

Forms of Business: Proprietorship, partnership, joint stock companies, joint sectors and co-operative movements

Cost Accountancy: Various types of costs, profit/volume ratio. Break even analysis and marginal costing

Production Planning and Control: Job, Batch and mass production, production efficiency, productivity. Site selection. Production planning. Routing, scheduling and follow up. Elements of time and motion study. Quality control and quality assurance

Nature and Scope of Economics: Basic concept of managerial economics. Supply and demand, free competition, monopoly and oligopoly

EIGHTH SEMESTER

EC 459 A - MICROWAVE ENGINEERING (EC)

3L, IT

3 Hours, 50 Marks

Wave Guides: Theory of wave propagation in rectangular wave guides, cut off frequency. Dominant and higher modes. Generation of different modes and suppression of unwanted modes. Field distribution. SWR and impedance relations in wave guides. Coupling between coaxial lines and wave guides. Wave guide stub-matching

Resonators: Theory and application of cavity resonators. Coupling to cavity, Q of cavity resonators

Microwave Components: Details about attenuators, phase shifters, directional couplers, tees, isolators, circulators, tuning, screws, coupling probe, loops, mixers and detectors. Use of scattering parameters

Microwave Generators and Amplifiers: Theory of velocity modulation. Theory of operation and characteristics of two cavity and multicavity klystron, amplifier and oscillators. Reflex klystron. O and M type travelling wave tube and backward wave oscillators - principle of operation. Construction, type and application of Magnetrons.

Microwave Solid State Devices: Special considerations for UHF and microwave transistors and oscillators. Parametric amplifiers. Manley-Rowe relation, linearized equations. Parametric up converters. Negative resistance amplifiers. Principle of working and application of impact diode, hot carrier diode, PIN diode, Gunn diode and LSA diode. Quantum mechanical explanation, description and application of MASER amplifiers.

EC 451 A - DIGITAL SIGNAL PROCESSING (EC)

3L, IT

3 Hours, 50 Marks

Digital Signal Processing: Advantages of digital filters and processing. Fundamentals of discrete time systems. Fourier transform of sequences. Discrete-time filter structures. Z-transform system representation, solution of linear constant co-efficient difference equations. Digital filters design by transformation from analog filters. Simple realizations of IIR and FIR filters. DFT and FFT.

EC 452 A - ELECTRONIC INSTRUMENTATION (EC)

3L, IT

3 Hours, 50 Marks

Transducers: Construction, characteristics and circuits for common types of resistive, capacitive, inductive, magneto-structive; piezo-electric. Photo-electric and thermo-electric transducers for measurement of process physical variables. Various sensing elements and transducers for measurement of Force, Pressure, Humidity, Moisture, strain, Velocity, Acceleration and pH. Inductive and Capacitive proximity switches. Physical and electrical loading of and by the transducer Systems.

Signal Conditioning: Analog and digital signal conditioning for instrumentation. Applications of OPAMP, A/D and D/A converters. Use of microprocessors. Techniques of S/N ratio improvement, Methods of shielding and grounding. Protection from RFI & EMI.

Electronic Displays: Principle of LED numeric, matrix and alpha-numeric displays, gas discharged plasma panels, flat panel CRT, LCD, electro-luminiscent and electrophoretic displays.

Digital Instrumentation: Principle of operation of probes, logic monitors, digital pulser and logic analyser. Components of a digital universal counter. Digital period; frequency and time interval measurement. Errors

in digital counter. High frequency measurement with digital counters. Different types of integrating and non-integrating digital voltmeters and multimeters, Errors and field applications of various digital voltmeters and counters. Introduction to Digital oscilloscope. Elements of data acquisition systems.

EC 457 A - MOBILE COMMUNICATION ENGINEERING (EC)

3L, IT

3 Hours, 50 Marks

Basic technical concepts: Concept of mobile telecommunications. Mobile radio network issues, cell size, coding, modulation and diversity. Base station subsystems. Access methods. Location strategies for personal communications services. Cell design principles.

Radio Paging System: Types of radio paging system. On-site and wide area paging, digital codes like POCSAG, elements of radio paging system engineering.

Microcellular radio communications: Fixed and dynamic channel assignment. Cellular systems and power control. Basic features and system architecture in cordless telephones. Marine and aircraft communication. Overview of mobile terrestrial communication by satellite.

Cellular Radio System: Allocation of spectrum and channels, Concept of Hexagon cells, mobile identification system and registration of mobile, call procedure and measurement of signal strength, GSM and CDMA radio system architecture, roaming, digital speech and channel coding. Efficient use of radio spectrum, multi operator working, cells and frequency reuse.

EC 486 A - COMPUTER COMMUNICATION AND DATA NETWORKS (EC)

3L, IT

3 Hours, 50 Marks

Computer Communication: Layered architecture of computer communication networks. DNA, SNA and ISO-OSI models. Properties of LANs, MANS and WANs. Physical level, data link and transport protocols. Multiple access protocol organization. Routing techniques, flow and congestion control in packet switched networks. Window scheme. Network interconnection-bridges and routers. Dead lock avoidance. Elements of queuing analysis. Introduction to network security.

Data Networks: Structure and functions of network protocols. Data link control procedures. Operation of HDLC, SDLC, BISYNC, X.25 and X.21 Protocols Elements of Polling, ALOHA, Reservation ALOHA, CSMA and token ring. Characteristic features of LANs

Basics of Internet: Evolution; dialup, XDSL, ADSL, cable modem and other access methods. IP address and domain name system, TCP/IP, Internet applications and www.

ELECTIVES

EC 481 A - MEDICAL ELECTRONICS (EC)

3L, IT

3 Hours, 50 Marks

Introduction to Physiology: Physiological system of the human body. Nerve physiology. Function of nerves and myoneural junction. Cardiac muscle and its contractions. Blood flow system. Arterial pressure. Mechanism of respiration, Function of spinal cord. Generation, propagation and distribution of action potentials.

Recording of Bio-electric Events: Kinds of electrodes, amplifiers and display units for recording bioelectric potentials. Principles of ECG, EEG, and EMG. Electrophysiological signals from a micro electrode and salt bridge, Use of field effect-devices as electrometers. Principle of driven shield. Use of photon-coupled amplifiers. Artifacts

Bio-Medical Measurement: Electronic methods of measuring blood pressure, blood flow, blood pH, skin and systemic body temperature and pulse rate.

Electronic Medical Instrument: Electronic pace makers. Implantable power sources. Defibrillators. Micro power transmitter for telemetering bio-signal. Surgical and therapeutic diathermy units. Physiological stimulators. Basic diagnostic X-ray units. Introduction to patient monitoring and intensive care units.

EC 482 A - DESIGN PRINCIPLES OF COMMUNICATION SYSTEMS (EC)

3L, IT

3 Hours, 50 Marks

Design methodology: Design methodology for AM and FM radio broadcast, transmitters and receivers.

Design aspects of PCM: PCM transmitters and receivers with base band transmission.

Design considerations for microwave and optical communication: analog and digital microwave communication. LOS links, tropo scatter links and optical communication links

EC 484 A -SOLID STATE AND IC TECHNOLOGY (EC)

3L, IT

3 Hours, 50 Marks

Solid State Device Fabrication: Crystal growth and doping. Impurity control and junction formation methods. Zone processes, Pick's laws, Evaluation of diffused layers. Epitaxial- systems and processes

Fabrication considerations: Diffusion during subsequent processing. Oxidation techniques and oxide masking. Etching techniques and processes, Photo-engraving. Contacts and interconnections. Alloying Epitaxial planner technology. Packaging, Scaling, Introduction to the technology of semiconductor devices using III-V & II-VI groups compounds

IC Fabrication: -Epitaxial growth. Surface passivation techniques. Photolithography. Etching. Junction formation. Diffusion processes. Constant source and limited source diffusion. Ion implantation. Isolation techniques. Monolithic diodes, transistors, capacitors and resistors. Differences in bipolar and MOS-ICs. Introduction to thin and thick film techniques

EC 485 A - COMPUTER AND MICROPROCESSOR CONTROL OF INDUSTRIAL PROCESSES (EC)

3L, IT

3 Hours, 50 Marks

Process Control Computer Systems: Minis, Micros classification by hardware features and software facilities. Performance evaluation techniques. System selection criteria

Characteristics of Digital Processors: Organisation and characteristics for process control. Input/output arrangements. Addressing techniques. Memory systems

Device Technology and Process Environment: Assessment of the use of digital switching devices in hazardous environments—Noise, temperature, humidity, vibration-static and dynamic.

Transducers: Generation of digital signal using process transducers, Multiplexing

Process Control System Software: Introduction to process control languages, application packages and operating system for real time process control. Development systems for Micros Introduction to logic analyser, cross assembler and cross compilers

EC 487 A - ENTREPRENEURSHIP DEVELOPMENT (EC)

3L, IT

3 Hours, 50 Marks

Entrepreneurship and Economic Development: Definition of entrepreneurship. Entrepreneurship and economic growth. History of Socio-Economic development in India. Achieving societies and their development statistics. Characteristics of under-developed, developing and developed societies, Wage employment and self-employment, Linkage between large, medium and small scale industries.

Entrepreneurship Characteristics and Skills: Identification of personal characteristics of an entrepreneur. Goal setting, risk taking, decision-making, time management and problem solving. Staff assessment

Creativity: Hindrance to creative thinking, developing creativity, personality traits of creative persons

Leadership: Qualities and influencing abilities. Negotiation skills and their development

Communication: Types of communication, barriers to effective communication, methods for improving communication

Entrepreneurship Opportunities and Selection: Types of entrepreneurship opportunities— manufacturing, service, trading and professional, Need analysis. Identification of local resources

Evaluation of Potential Opportunities: Setting decision criterion and selection of product/service/profession. Evaluation Technical, Financial and Economic feasibility

Starting a New Enterprise: Nature of information necessary for getting started. Information from governmental agencies like, SISI, RICO, RFC, DIC etc. Procedural requirements for establishing new enterprise, Selecting type of business organisation. Registration and Licensing, Incentive and Facilities available for small scale enterprises.

Enterprise Management: Product Design and Development Concepts of product design and development. Design by innovation and evolution. Enhancing product value

Facilities Planning and Production Management: Selection of relevant technology. Make or buy decisions. Plant layout and process planning, setting production levels and delivery schedules, Economic utilisation of labour, raw material and equipment. Inventory Management. Control of production plants. Quality assurance and quality circle

Product Costing: Fixed costs and variable costs. Sales price and revenue. Break even analysis. Product Pricing. Profit planning

Financial Management: Financial Management and accounting in small enterprise, Difference between financial, accounting, cost accounting and management accounting, Book-keeping, Balance sheet, "Profit and Loss Account and their analysis. Cash flow and financial ratio". Assessing financial needs of enterprise. Fixed and Working Capital, Sources of funding

Financial Regulation and Taxes: Sales Tax Act, Income Tax Act, Excise, Local Taxes and Insurance

Practical Work: Students be given practical work in identification of opportunities, need analysis, market survey, evaluation of alternatives and preparation of feasibility report

EC 488 A – RELIABILITY AND MAINTAINABILITY OF ELECTRONIC SYSTEMS (EC)

3L, IT

3 Hours, 50 Marks

Introduction: Life cycle, Reliability and Maintainability management, design reviews.

Reliability: Mathematical modeling, environmental factors, fault tree analysis, failure reporting and corrective actions, reliability testing.

Maintainability: Mathematical modeling, system design, unit design, assembly design, maintainability testing, reliability and maintainability documents.

EC 489 A - ROBOTICS ENGINEERING (EC)

3L, IT

3 Hours, 50 Marks

Introduction: Basic Robot elements, Types of Robots, Industrial applications, Future trends.

Robot Electronics: Servo control systems of robots, servo motors, stepper motors, Electro-hydraulic motion, Pneumatic controls, Robotic sensors, various encoders and linear scales. Sensor interfacing, data acquisition and conversion systems. Robot vision systems. Application of micro-controllers for robots. Robot and operator safety.

Mechanical Systems of Robots: Object, Position and Time in three dimensions. Grippers, transporters, rotators, cable drive systems, ball and roller bearing screws and splines, electrically released clutches and brakes, harmonic drive transmission system and gearing, shock absorption.