Government College of Engineering Amravati

(An Autonomous Institute of Government of Maharshtra)

Curriculum for V and VI semester Electronics and Telecommunication

Department of Electronics and Telecommunication
2009-2010

DEPARTMENT OF ELECTRONICS and TELECOMMUNICATION
SCHEME FOR B.TECH.

Sem III													
Course Code	**Name of the Course**	**Teaching Scheme**				**Evaluation Scheme**							
						Theory				**Practical**		**Total**	**Credits**
		Theory Hrs /week	**Tutorial Hrs/week**	**Practical Hrs/week**	**Total**	**TA**	**CT1**	**CT2**	**ESE**	**Internal**	**External**		
ET301	Engineering. Maths III	4	---	---	4	10	15	15	60	---	---	100	4
ET302	Component Devices andTechnology	4	---	---	4	10	15	15	60	---	---	100	4
ET303	Electrical Engineering.	4	---	---	4	10	15	15	60	---	---	100	4
ET304	Electronics Devices and Circuits	4	1	---	5	10	15	15	60	---	---	100	5
ET305	Instrumentation	4	---	---	4	10	15	15	60	---	---	100	4
ET306	General Proficiency I		---	**2**	2	---	---	---	---	50	---	50	2
ET307	Component Devices andTechnology Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET308	Electrical Engineering. Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET309	Electronics Devices and Circuits Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET310	Instrumentation Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
Total		**20**	**1**	**10**	**31**	**50**	**75**	**75**	**300**	**150**	**100**	**750**	**27**
Sem IV													
ET401	Engineering. Maths IV	4		---	4	10	15	15	60	---	---	100	4
ET402	Fundamentals of communication	4	1	---	5	10	15	15	60	---	---	100	5
ET403	Digital Electronics	4	---	---	4	10	15	15	60	---	---	100	4
ET404	Network analysis	4	---	---	4	10	15	15	60	---	---	100	4
ET405	Humanities and Economics	4	---	---	4	10	15	15	60	---	---	100	4
ET406	General Proficiency II	---	---	2	2	---	---	---	---	50	---	50	2
ET407	Engineering. Maths IV Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET408	Fundamentals of communication Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET409	Digital Electronics Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET410	Network analysis Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
Total		**20**	**1**	**10**	**31**	**50**	**75**	**75**	**300**	**150**	**100**	**750**	**27**

TA :Techer Assesment CT: Class Tests ESE: End Sem.Examination : Duration two hours thirty minutes

DEPARTMENT OF ELECTRONICS and TELECOMMUNICATION

PROPOSED SCHEME FOR B.TECH.

Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical		Total	
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT 1	CT 2	ESE	Internal	External		
Sem V													
ET501	Electromagnetic fields	4	---	---	4	10	15	15	60	---	---	100	4
ET502	Consumer electronics	4	---	---	4	10	15	15	60	---	---	100	4
ET503	Power Electronics	4	---	---	4	10	15	15	60	---	---	100	4
ET504	Analog Circuits	4	1	---	5	10	15	15	60	---	---	100	5
ET505	Control System Engineering.	4	---	---	4	10	15	15	60	---	---	100	4
ET506	Electromagnetic fields Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET507	Consumer electronics Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET508	Power Electronics Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET509	Analog Circuits Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET510	* Laboratory I	---	---	2	2	---	---	---	---	25	25	50	2
Total		**20**	**1**	**8**	**31**	**50**	**75**	**75**	**300**	**125**	**125**	**750**	**27**
Sem VI													
ET601	Linear Integrated Circuits	4	---	---	4	10	15	15	60	---	---	100	4
ET602	Communication Engineering	4	---	---	4	10	15	15	60	---	---	100	4
ET603	Microprocessor and its Interfacing	4	1	---	5	10	15	15	60	---	---	100	5
ET604	Computer Oriented Operation Research	4	---	---	4	10	15	15	60	---	---	100	4
ET605	Industrial Management and Quality Control	4	---	---	4	10	15	15	60	---	---	100	4
ET606	Linear Integrated Circuits Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET607	Communication Engineering Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET608	Microprocessor and its Interfacing Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET609	Computer Oriented Operation Research Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET610	Minor Project	---	---	2	2	---	---	---	---	25	25	50	2
Total		**20**	**1**	**10**	**31**	**50**	**75**	**75**	**300**	**125**	**125**	**750**	**27**

TA :Techer Assesment CT: Class Tests ESE: End Sem.Examination : Duration two hours thirty minutes

*** Laboratory-I -Experiments will be based on all subjects**

DEPARTMENT OF ELECTRONICS and TELECOMMUNICATION

PROPOSED SCHEME FOR B.TECH.

Sem VII													
Course Code	Name of the Course	Teaching Scheme				Evaluation Scheme							Credits
						Theory				Practical		Total	
		Theory Hrs /week	Tutorial Hrs/week	Practical Hrs/week	Total	TA	CT1	CT2	ESE	Internal	External		
ET701	Digital Communication	4	----	---	5	10	15	15	60	---	---	100	4
ET702	Digital Signal Processing	4	---	---	4	10	15	15	60	---	---	100	4
ET703	Electronics Circuit Design	4	---	---	4	10	15	15	60	---	---	100	4
ET704	Fibre Optics Communication	4	----	---	4	10	15	15	60	---	---	100	4
ET705	Elective I 1.Microprocessor and Microcontroller, 2.Biomedical Engineering. , 3.Fuzzy Logic and Neural Network , 4.Computer Organization and Architecture	4	----	---	4	10	15	15	60	---	---	100	4
ET706	Digital Signal Processing Laboratory	----	---	2	2	---	---	---	---	25	25	50	1
ET707	Electronics Circuit Design Laboratory	----	----	2	2	---	---	---	---	25	25	50	1
ET708	Fibre Optics Communication Laboratory	----	----	2	2	---	---	---	---	25	25	50	1
ET709	Project and seminar	---	---	4	4	---	---	---	---	50	50	100	4
Total		20	2	10	31	50	75	75	300	125	125	750	27
Sem VIII													
ET801	Digital System Design	4	---	---	4	10	15	15	60	---	---	100	4
ET802	Microwave Engineering.	4	---	---	4	10	15	15	60	---	---	100	4
ET803	Elective - II 1.Wireless Communication, 2. Satellite Communication, 3. Communication Network, 4.Speech processing	4	---	---	4	10	15	15	60	---	---	100	4
ET804	Elective - III 1.Digital Image Processing, 2.Very Large Scale Integration Design, 3.System Software4.Bioinformatics,	4	---	---	4	10	15	15	60	---	---	100	4
ET805	Digital System Design Laboratory	----	---	2	2	---	---	---	---	25	25	50	1
ET806	Microwave Engineering. Laboratory	---	---	2	2	---	---	---	---	25	25	50	1
ET807	* * Laboratory II	---	---	2	2	---	---	---	---	25	25	50	1
ET808	Project and seminar	---	---	6	6	---	---	---	---	100	100	200	8
Total		16	---	12	28	40	60	60	240	175	175	750	27

TA :Techer Assesment CT: Class Tests ESE: End Sem.Examination : Duration two hours thirty minutes

**** Laboratory-II -Experiments will be based on Elective III**

ET501 ELECTROMAGNETIC FIELD

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Vector analysis: Review of scalars and vectors, vector algebra. The coordinate system: rectangular, cylindrical and spherical. Scalar and vector fields, differential elements of length, surface and volume.

Electrostatics: Introduction to Coloumb's law, electric field intensity, flux density, Field of line charges, field of surface charges, Gauss's law, divergence, divergence theorem, Maxwell's first equation, electric potential and potential gradient**.**

Magnetostatics: Current and current density, continuity equation, Biot-Savart's law, Ampere's circuital law and applications, Curl, Stock's theorem, magnetic flux and flux density, scalar and vector magnetic potentials. Maxwell's equations for steady field.
Maxwell's equations and boundary conditions: Maxwell's equations for time varying fields, electric and magnetic boundary conditions.

Electromagnetic waves: Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle.

Waveguides: Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, loses in wave guide, introduction to circular waveguide.

Radiation: Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole.

Text Books

1. Engineering Electromagnetics (7th edition, 2006), by W.H Hayt. and J.A. Buck, Tata Mc-Graw Hill.
2. Electromagnetic Waves and Radiating System (2nd edition, 1985), by E.C. Jordan and K.C. Balamin Prentice Hall of India Private Limited.

Reference Books

1. Elements of Engineering Electromagnetics, by Rao (6th edition, 2006), Pearson education
2. Electromagnetics (3rd edition, 1984), by J.D Krauss, Mc-Graw Hill.
3. Fields and Waves in Communication Electronics (3rd edition), by S. Ramo and R. Whinnery, John Wiley and Sons.
4. Fundamental of Electromagnetic with MATLAB (1st edition, 2008), by K. E. Lonngren and S. V. Savov, Prentice Hall of India.

ET502 CONSUMER ELECTRONICS

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Electroacoustic transducers : Microphone: types, characteristics, construction and principle of operation of carbon, condenser, electric, moving coil, tie-clip, wireless microphone, loudspeakers : types, construction and operation of horn type, moving coil, woofer, tweeter, column speakers, head phones and hearing aids, cross over network, loud speaker baffles and enclosures, Room acoustics

Audio recording and reproduction : Sound recording, magnetic recording, optical recording; sound reproduction, hi-fi system, stereo phony and quadraphonic, equalizers, distortions in tape equipment, noise reduction, active tone control circuit, FM stereo

multiplex system,CA810 audio power amplifier, music synthesizers, Dolby system, compact disc recording and reproduction

Video recording : Tape recording**,** slant azimuth system, color recording, video cassette recorder; optical disc recording, video high density (VHD), video disc recording system, ultrasonic remote control transmitter, frequency signal encoding

Camera tubes and TV receiver : Introduction, monochrome TV Camera, Principles of photoelectric effects, different camera tubes, characteristics of camera tubes, color TV Camera, colorplexed composite video signal, color signal generation and encoding. TV receiver tuners, video IF amplifier, video detector, sound and video amplifier, picture tubes, color TV tubes, color TV Receiver, color signal decoding and matrixing

Digital television: Transmission and reception, signal quantization and encoding, digital satellite television, direct-to-home (DTH) television, high definition television (HDTV), flat panel display TV receivers, plasma television screen, plasma color receiver, LCD color receiver, digital Light Processing (DLP) projection system

Telecommunication systems and electronic appliances: Telephone signaling and switching system, stored program control, optical fiber cable, local distribution network, wireless local loop (WLL), cellular communication system, Operation and working of facsimile, xerography, microwave oven, washing machine, refrigerators, Bar code scanner and decoder

Text Book

1. Consumer Electronics, (1st edition, 2005) by S. P. Bali, Pearson Education

Reference Books

1. Modern Television Practice, (3rd edition, 2006), by R. R. Gulati, New Age International Publishers
2. Television Engineering, (2nd edition, 1889), by A. M. Dhake, Prentice Hall of India

ET503 POWER ELECTRONICS

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Power semiconductor devices: Structure, operation and characteristics of power transistor, SCR, DIAC, TRIAC, MOSFET, IGBT, GTO and its ratings, two transistor analogy for SCR, Turning on and off mechanism with its dynamic characteristics, thyristor firing circuits, *dv*/*dt* and *di*/*dt* protection.

Equalising circuits: Series and parallel operation of SCR's, static and dynamic equalising circuit, equalisation of current in parallel connected SCR's, string efficiency, derating factor, protection of SCR's against *di*/*dt*, *dv*/*dt*, radiofrequency interference, over voltage, over current.

Phase controlled rectifiers: Principle of phase control, natural and line commutation, single phase half and full controlled bridge rectifier with *R* and *RL* load, derivation for output voltage and current, Three phase Half and fully controlled bridge rectifier with highly inductive load with its circuit diagram, operation and waveform, derivation of average and rms load voltage, effect of free wheeling diode, single phase dual converters.

Ch**opper, inverter and converters:** Basic principle of chopper, step - down and step– up chopper, continuous and discontinuous conduction, time ratio control, current limit control, AC chopper, voltage commutated chopper circuits, Jone's chopper, Series inverter, improved series inverter, Parallel inverters, output voltage and waveform control, principle of operation for three phase bridge inverter in 120^0 and 180^0 mode, basic principle of cycloconverters, single phase to single phase cycloconverter.

Applications: Uninterrupted power supply (UPS) – operation and configuration, battery-Ah, back up time and battery charger rating calculations, speed control of DC shunt motor using phase controlled rectifiers, speed control of three phase induction motor by stator voltage control, v/f control and slip power recovery scheme, static circuit breaker, fan speed regulator, principle of soft start circuit, zero voltage switch.

Text Books

1. Power Electronics Circuits, Devices and Applications (3rd edition , 2004), by M. H. Rashid , Prentice Hall of India
2. Power Electronics, Converters, Application, and Design (3rd edition , 2003), by N. Mohan, T. M. Undeland and W. P. Robbins, John Willey and Sons

Reference Books

1. Power Electronics (2004), by M. S. Jamil Asghar Prentice Hall of India
2. Industrial Electronics and Control, by S. Bhattacharya, S. Chatterjee,Tata Mc-Graw Hill
3. Power Electronics (3rd edition, 1993), by C. W. Lander, Mc-Graw Hill International
4. Introduction to Power Electronics (1st edition, 2004), by Jaganathan, Prentice Hall of India
5. Modern Power Electronics and AC Drives (1st edition, 2003), by B. K. Bose, Pearson Education

ET504 ANALOG CIRCUIT

Teaching Scheme: 04L+1T Total: 05 Credit: 05
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Feedback amplifiers and its response: Feedback concept, transfer gain, general characteristics of negative feedback amplifier, input resistance and output resistance, methods of feedback amplifier and their effects. Effect of feedback on bandwidth, stability, tests for stability.

Frequency response of amplifiers: Characteristics, step response of amplifier, high frequency response of common emitter stage, gain bandwidth product, frequency response of cascaded stages, cascode (CE-CB) amplifier.

Transistorized circuits and its analysis: Astable, monostable and bistable multivibrators, Time base generators and sweep generators, Schmitt trigger.

High frequency transistor and its analysis: High-frequency T model, common base short-circuit and common emitter short-circuit current, frequency response, alpha cut-off frequency, hybrid- pi (□) common emitter transistor model, current gain with resistive load, transistor amplifier response.

Linear wave shaping using RC and RL circuits: Analysis and calculations of RC low pass and high pass filters, analysis of clipping and clamping circuits using diodes.

Introduction to SPICE: Circuit element sources in SPICE/PSPICE, DC Circuit analysis, transient analysis, A.C. circuit analysis for R, L, C circuits modeling, analysis of diode, BJT and FET circuits, simulation of transistorised and RC/RL circuits.

Text Books

1. Integrated Electronics (3rd edition, 2006), by J. Millman, C. Halkias, Tata McGraw Hill,
2. Electronic Devices and Circuits (1st edition, 2000), by D. Churuku, B. T. Krushna, Pearson Education

Reference Books

1. Pulse Digital and Switching Waveforms (2nd edition, 2003), by J. Millman and H. Taub, McGraw Hill Company.
2. Electronic Devices and Circuits (5th edition, 2002), by R. Boylestad, Prentice Hall of India
3. Electronics Devices and Integrated Circuits (1st edition, 2006) by Singh, Pearson Education
4. SPICE for Circuits and Electronics using PSPICE (2nd edition, 2003), by M. H. Rashid, Prentice Hall of India

ET505 CONTROL SYSTEM ENGINEERING

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Introduction to automatic control system: Open Loop and closed loop control system and servomechanism mathematical modeling of physical system transfer function Block diagram reduction technique signal flow graph effect of feed back on sensitivity and reduction of noise

Introduction to time response analysis first and second order systems: Standard test signals time response specifications Error analysis and error constants Steady state errors P-I-D controllers

Stability of control system: Routh-Hurwitz stability criterion error criterion relative stability Root locus technique procedure to plot the root locus problems on root locus effect of addition of pole and zeros stability analysis from root locus

Frequency response of linear systems: Specifications Bode plot derivation of transfer function (T.F.) from Bode plot, polar plot Nyquist criterion stability analysis from Nyquist plot

State space representation of system: Conversion of state variable model to T. F., Conversion of T.F. to state variable model, solution of state equations, concept of controllability and observability

Z transform: Representation of sampled data, review of Z transform, sample and hold circuit, solution of difference equation by Z transform, pulse transform function of open loop and closed loop system with different sampler location, digital controller and its T.F., stability analysis of discrete time system using bilinear transformation

Text Book

1. Control System Engineering (2nd edition, 1982), by I.J. Nagrath, L. M. Gopal, Wiley Eastern

Reference Books

1. Automatic Control Systems (7th edition), by B.C. Kuo, Prentice Hall of India
2. Modern Control Systems (4th edition, 1996), by K. Ogata, Prentice Hall of India
3. Control System Theory and Application, (1st edition, 2006), by S. Ghosh, Pearson Education

ET506 ELECTROMAGNETIC FIELD LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline

List

A) Simulation and verification of

1. Coulomb's law.
2. Gauss's law.
3. Ampere's circuital law.
4. Maxwell's Equation for time varying field.
5. Stroke's theorem.
6. Divergence, gradient and curl.
7. Wave equation in perfect conductor.

8. Wave equation in lossy medium.

B) Modes in rectangular waveguide.

ET507 CONSUMER ELECTRONICS LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum of this semester and the list is just a guideline:

List

1. Cross-over networks.
2. Active tone control circuit.
3. Audio power amplifier (CA810).
4. Tape recorder transport mechanism.
5. Public address system.
6. Monochrome television receiver.
7. Wireless liquid crystal display unit.
8. Local telecommunication switching system.
9. Photocopying/Xerography unit.
10. Bar code scanning and decoding unit.
11. Microwave oven.
12. Washing machine unit.

ET508 POWER ELECTRONICS LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline.

List

1. V-I characteristics of (i)SCR (ii) TRIAC (iii) MOSFET (iv) IGBT (v) DIAC.
2. Jones chopper.
3. Step up/down chopper.
4. Single-phase full controlled rectifiers using SCRs.
5. Three phase full controlled converters.
6. Series inverter.
7. Parallel inverter.
8. Speed control of DC motor.

ET509 ANALOG CIRCUITS LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline.

List

1. Feedback amplifier.
2. High frequency response of common emitter stage, cascaded and cascode amplifier.
3. Step response of amplifier.
4. Transistor as multivibrator.
5. Sweep generator and Schmitt trigger.
6. Clipping, clamping, RC high pass and low pass filter.

7-10. Minimum 4 experiments based on PSPICE.

ET510 LABORATORY I

Teaching Scheme: 02P Total: 02 Credit: 02
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline.

1. Scope of MATLAB (matrix manipulation).
   a. Symbolic mathematics tool box (solving ordinary differential equation).
   b. Communication tool box (modulation and demodulation).
   c. DSP tool box (convolution).
   d. Ordinary differential equation tool box (solving ordinary differential equation).
   e. Control system tool box (block diagram)
   f. Communication tool box (simulation of communication circuit).
2. PCADD (design of antenna).
3. MULTISIM (circuit design).
4. ULTIBOARD (PCB design).
5. Simulink.

Some experiments which are not covered in other laboratories may also be conducted in laboratory 1 or report based on industrial visit

ET601 LINEAR INTEGRATED CIRCUITS

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Differential amplifier: Introductory concepts and fundamentals like Decibel, Bode plot, circuit simulations, etc. Differential amplifier fundamentals, transisterised configurations DC and AC analysis (detailed analysis of any one configuration), transfer characteristics, common mode rejection ratio (CMRR), input and output impedances, constant current bias, current mirror

Operational amplifier (op-amp): Ideal op-amp characteristics; schematic development stages of op-amp: current sources and active loads, difference, intermediate and output stages including Miller capacitors for frequency computation; operational amplifier parameters, features, data sheet interpretation; effects of real operational amplifier parameters on circuit performance, frequency response and stability, frequency and phase compensation techniques

Op-amp applications: Inverting and non-inverting, voltage follower, differential and bridge amplifiers, summer, integrator, differentiator; analog computation, basic building blocks, basic linear differential equation; voltage-to-current and current-to-voltage converters, analog multipliers, dividers, sample and hold circuits; peak detectors, precision rectifiers; instrumentation and isolation amplifiers, current and voltage sources, active filters: response and analysis of first and second order Butterworth filters, response of Chebyshev, Elliptic filters; comparators, Schmitt trigger, clippers and clampers; precision rectifiers; logarithmic amplifiers, multifunction circuits and true rms converters; phase lock loop (PLL), PLL as amplitude and frequency modulation detection, frequency shift keying (FSK) decoder, frequency synthesiser.

Waveform generation: Sinusoidal feedback oscillators, feedback topologies and analysis for discrete transistor amplifiers, stability of feedback circuits using Barkhausen criteria. Relaxation oscillators, square-triangle oscillators; astable and monostable multivibrators and their design; timer circuit and its use and design as multivibrator

Analog and digital interface circuits: analog to digital (A/D) and digital to analog (D/A) converters, sample and hold circuits and multiplexers.

Text Books

1. Op-amps and Linear Integrated Circuits (4th edition 2008), by R. A. Gayakwad, Prentice Hall of India
2. Design with Operational Amplifiers and Analog Integrated Circuits (3rd edition, 2002), by S. Franco, Tata McGraw Hill

Reference Books

1. Introduction to Operational Amplifier Theory and Applications (2nd edition 1991), by J. V. Wait, L. P. Huelsman and G. A. Korn, McGraw Hill
2. Op-amp and Linear Integrated Circuits Theory and Applications (1st edition, 2001), by J. M. Fiore. Delmar Thompson Learning
3. The Art of Electronics (2nd edition, 1989), by P. Horowitz and W. Hill, Cambridge University Press
4. Operational Amplifiers and Linear Integrated Circuits (1st edition, 2006), Pearson Education

ET 602 COMMUNICATION ENGINEERING

Teaching Scheme: 04L Total : 05 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Amplitude Modulation: Amplitude modulation (AM), DSB-SC, SSB, VSB and ISB transmissions, mathematical Analysis, modulation index, frequency spectrum, power requirement of these systems, generation of AM signal.

Angle Modulation: Frequency modulation (FM), mathematical analysis, modulation index, frequency spectrum, power requirement of FM, narrowband and wideband FM, noise triangle in FM, pre-emphasis and de-emphasis techniques, phase modulation, power contents of the carrier and the sidebands in angle modulation, noise reduction characteristics of angle modulation, generation of FM signals, comparison between AM and FM. **Receivers:** Basic receiver (TRF), super heterodyne receiver, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AGC technique, AM detectors, FM discriminators, AFC technique, double-spotting effect, details of each block of AM and FM receiver.

Formalizing signals and analysis: Energy and power signals, signal properties: periodicity, absolute integrability, determinism and stochastic character, some special signals of importance: unit step, unit impulse, sinusoid, complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals, representation of periodic signal using Fourier series, representation of arbitrary functions using Fourier transform, time-domain and frequency domain representation of signals, Fourier transforms of some useful functions, singularity functions, properties of Fourier transform, energy and power density spectra, correlation functions.

Probability theory and random signal: Basics of probability, random variables, transformation of variables, statistical averages, some useful probability models, introduction to random processes, ensemble averages, system with random signal excitation, spectral densities, Gaussian process.

Sampling theorem: Uniform and non-uniform quantization in pulse code modulation (PCM), μ-law and A-law PCM, differential PCM, delta modulation and adaptive delta modulation (DM/ADM), bandwidth requirement of PAM, PPM, PWM, PCM, and TDM.

Noise performance of various communication systems: Noise performance of linearly modulated signals: envelope detector and coherent detector, noise performance of FM, noise performance of PCM.

Text Books

1. Principles of Communication Systems (3rd edition 1995) by Taub, Schilling and G. Saha, McGraw-Hill
2. Communication Systems (4th edition, 2000) by S. Haykin, John wiley & Sons

Reference Books

1. Fundamental of Communication System (1st edition, 2006),by J. G. Proakis, Pearson Education
2. Electronic Communication (4th edition) by Roddy and Coolen, Prentice Hall of India.
3. Electronic Communication System a Complete Course (4th edition) by Schweber, Prentice Hall of India.
4. Electronic Communication Systems (4th edition 1999) by D. Kennedy, Tata McGraw-Hill

ET603 MICROPROCESSOR AND ITS INTERFACING

Teaching Scheme: 04L+1T Total: 05 Credit: 05
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Microcomputer block diagram and its working, evolution of microprocessors, comparison of 4, 8, 16, 32, 64-bit microprocessors, 8085 microprocessor architecture and its operation, memory orgnisation, memory map, 8085-pin diagram, instruction timings and operation status.
Demultiplexing the low order bus, generating control signals, memory mapped I/O, I/O mapped I/O, address decoding techniques.
Addressing modes, instruction set of 8085, programs using data transfer, arithmetic, logical, branch operation, counter and time delays, stack and subroutines.
Interrupt system of 8085, data transfer schemes, synchronous, asynchronous and interrupt driven data transfer schemes, introduction to DMA data transfer schemes, serial data transfer through SOD and SID pins.
Internal architecture, programming and interfacing of 8255, 8259 and 8279 peripherals
Block diagram of 8086, advantage of segment registers, internal operation, addressing modes, instruction formats, instruction execution timing.
Instruction set of 8086 microprocessor, data transfer, arithmetic, branch, logical, shift, and rotate instructions, assembler directives and operators, stack and subroutine, string instructions.

Text Books

1. Microprocessor, Architecture, Programming and Applications with 8085(5th edition, 2004), by R. S. Gaonkar, Penram International Publication.
2. Microprocessor System 8086/8088 Family (2nd edition, 1996), by G. A. Gibson, Y. C. Liu, Prentice Hall of India.

Reference Books

1. Microprocessor and Interfacing, Programming and Hardware (2nd edition, 2005), by D. V. Hall, Tata McGraw-Hill.
2. Introduction to Microprocessor (3rd edition, 2004), by A. P. Mathur, Tata McGraw-Hill.
3. Microprocessors Principles and Application (2nd edition, 2005), by M. C. Gilmore, Tata McGraw-Hill.

ET604 COMPUTER ORIENTED OPERATION RESEARCH

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Operation Research (OR) modeling approach (Problem identification, modeling, finding solution, testing etc.), scope and limitations of OR.

Linear Programming (LP): Assumption and formulation of LP model, solution by graphical method, simplex and two phase simplex method, use of Excel to solve LP model, dual simplex method and sensitivity analysis, transportation and assignment models.

Project Management: CPM and PERT, finding critical path, time-cost trade off, resource smoothing and resource leveling.

Dynamic Programming: Introduction and characteristics, recursion in dynamic programming, investment problem, production scheduling problem, stage coach problem, equipment replacement, budget allocation problem , shortest route models and cargo loading.

Non-Linear Programming: Introduction, types, constrained and unconstrained optimization method, one variable and multivariable, steepest descent method, quadratic programming.

Decision Theory and Game Theory: Introduction, minmax decision procedure, Bays decision procedure with and without data, regret function versus loss function. minmax and maxmin strategies, expected payoffs, solution of $m \times n$ games, Brown algorithm

Machine Sequencing Problems: *n* jobs through two machines, *n* jobs through three machines, *n* jobs through m machines, two jobs through m machines sequencing problem

Text Books

1. Introduction to Operation Research (1st edition), by B. E. Gillet, McGraw-Hill,
2. Introduction to Operation Research, by H. A. Taha, Prentice Hall of India.
3. Introduction to Operation Research, Concepts and Cases (8th edition, 2004), by Hillier and Liberman, McGraw-Hill.

Reference Books

1. Operation Research (1st edition), by Tiwari and Shandilya, Prentice Hall of India.
2. Introduction to Optimization (3rd edition), by S. S. Rao, Prentice Hall of India
3. Computer Aided Project Management (2nd edition), by P. B. Mahapatra Prentice Hall of India
4. Operation Research (8th edition), by Natrajan, Balsubramani, Pearson Education

ET605 INDUSTRIAL MANAGEMENT AND QUALITY CONTROL

Teaching Scheme: 04L Total: 04 Credit: 04
Evaluation Scheme: 15 CT1 + 15 CT2 + 10 TA + 60 ESE Total Marks: 100
Duration of ESE : 2 Hrs.30 min.

Principles and Techniques of Management: Meaning, difference among business, management, administration and organization; Principles of management, Functions of management (Planning, direction, co-ordination, control, motivation, delegation and decentralization, communication, leadership and decision making), Organization structure and relationships,

Materials Management: Marketing strategy, market research, consumer behaviour, advertising and sales promotion, channels of distribution, pricing of products. classes of material, scope of material control, scope of purchasing department, purchasing procedures, order procedures, inventory control, production planning and control.

Personnel Management: Functions of personnel management (recruitment, selection, promotion, wages payment plans, training and development), Maslow needs, functions and scope of trade unions in Indian industries. Welfare of labour, problems of labour turn over and retention, human attitude, motivation theories, conflict management.

Financial Management: Project report, preparation of profit and loss statement and balance sheet, ratio analysis. Break even analysis, variance analysis, meaning and application of various budgets, types of budgets and their importance, principles of costing, cost sheet preparation.

Quality Control: Concept of quality and quality control, elements of quality, factors controlling quality of design and conformance, on-line and off-line quality control (tools and techniques) process control, process capability, inspection planning and scheduling, vendor rating, sampling inspection, sampling plans, online Taguchi approach.

Quality Management: Quality assurance, seven quality control techniques, concepts and applications of Kaizen, fish-bone diagram, failure mode and effect analysis (FMEA), PDCA cycle, six sigma, zero defect, ISO 9000 series, QS 14000, total quality management, elements of TQM, quality circles, quality audit system.

Text Books

1. Principles of Management, by H. Koontz, O. Donnel C. and Whierich, Tata McGraw Hill
2. Managing for total quality, (3rd edition) by Logothetics, Prentice Hall of India
3. Statistical Quality control, by Grant and Leavenworth, Tata McGraw-Hill

Reference Books

1. Total Quality Management, by S. M. Mody, D. L. Shah and Trust
2. Industrial Management and Managerial Economics, by P.B. Gupta and P. B. Sharma, Ratnasagar
3. Quality Control Systems, J R Taylor, McGraw-Hill
4. Principles of Management, P C Tripathi, P N Reddy, Tata McGraw-Hill
5. Financial Management (6th edition), by P Chandra, Tata McGraw-Hill

ET606 LINEAR INTEGRATED CIRCUITS LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline.

List

1. Measurement of op-amp parameters (IC 741).
2. Op-amp as voltage follower, adder, etc.
3. Op-amp as an inverting and non-inverting amplifier.
4. Op-amp as an integrator and differentiator.
5. Multivibrator using op-amp.
6. Filter using op-amp.
7. Instrumentation amplifier using op-amp.
8. Multivibrator using IC 555.
9. Phase lock loop parameters, AM and FM detector (IC 565).

ET607 COMMUNICATION ENGINEERING

Teaching Scheme: 02P Total: 02 Credit : 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight experiments shall be performed from the list given below. The experiments to be carried shall cover entire curriculum and the list is just a guideline.

List

1. Amplitude modulation.
2. Frequency modulation.
3. AM transmitter/receiver.
4. FM transmitter/receiver.
5. Noise spectral density.
6. Pulse Amplitude Modulation (PAM).
7. Pulse Position modulation (PPM).
8. Pulse Width Modulation (PWM).
9. Delta Modulation/Adaptive delta modulation (DM/ADM).
10. Time Division Multiplexing (TDM).
11. Five experiment based on Commsim software.

ET608 MICROPROCESSOR AND ITS INTERFACING LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight programs shall be performed from the list given below. The programs to be carried shall cover entire curriculum and the list is just a guideline.

List

1. Subtract larger number from smaller number (8 bit) using 8085 and verify the result. Also add two 16 bit numbers.
2. Find greatest number among the series using 8085.
3. Arrange the numbers in descending order using 8085.
4. Find the sum of given numbers in an array.
5. Write a main program and conversion subroutine to convert packed BCD number into equivalent binary number.
6. Perform memory to memory data transfer using 8085.
7. Different modes of 8255 PPI.
8. Addition and subtraction of two 16 bit numbers using 8086.
9. Find greater of two 16 bit numbers using 8086.
10. Transfer block of data from source to destination using string Instructions.

ET609 COMPUTER ORIENTED OPERATION RESEARCH LABORATORY

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

Minimum eight programs shall be performed from the list given below. The programs to be carried shall cover entire curriculum and the list is just a guideline.

List

Write a computer program for

1. Two Machine sequencing.
2. Three machine sequencing.
3. Traveling salesman problem.
4. Investment problem.
5. Linear programming.
6. Dual simplex.
7. Two phase simplex.
8. Transportation problem.
9. Critical path method/ programme evaluation review technique.
10. Inventory model (deterministic/probabilistic).

Note: Practical may be performed with any computer programming language, following languages/ packages are suggested
MATLAB/C/C++

ET610 MINOR PROJECT

Teaching Scheme: 02P Total: 02 Credit: 01
Evaluation Scheme: 25 Internal + 25 External Total Marks: 50

- Design, fabrication and testing of electronic circuits
- Learning of detailed electronic circuit design
- Submission of report