NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

THIRD ENGINEERING (T.E.)

ELECTRONICS AND COMMUNICATION,

ELECTRONICS AND TELECOMMUNICATION

TERM – I & II

W.E.F 2007 - 2008

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
T.E.(Electronics & Communication / Electronics & Telecommunication)

FIRST TERM

W.E.F. 2007-08

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Feedback Control System	4	--	2	3	100	25	--	--
2	#Electromagnetic Engineering	4	1	--	3	100	25	--	--
3	Digital Communication	4	--	2	3	100	25	25	--
4	*Microprocessor and Micro controller System	4	--	2	3	100	25	50	--
5	*Network Analysis and Synthesis	4	1	2	3	100	25	25	--
6	*Software Application-II	--	--	2	--	--	25	--	--
	Total	**20**	**2**	**10**	**--**	**500**	**150**	**100**	**--**
	Grand Total	**32**			**750**				

SECOND TERM

Sr. No.	Subject	Teaching Scheme Hours/week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	*Electronics Measurements	4	--	2	3	100	25	--	--
2	Power Electronics	4	--	2	3	100	25	25	--
3	*Electronics Circuit Design	4	1	2	3	100	25	50	--
4	Information Theory and Coding Techniques	4	1	--	3	100	25	--	--
5	*Analog Integrated Circuits and Applications	4	--	2	3	100	25	25	--
6	#Practical Training / Mini Project / Special Study	--	--	2	--	--	25	--	--
	Total	**20**	**2**	**10**		**500**	**150**	**100**	**--**
	Grand Total	**32**			**750**				

* Common with TE (Electronics)
# Common with TE (Electronics) and T.E.(Electrical)

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I

FEEDBACK CONTROL SYSTEM

Teaching scheme:
Lectures: 4 hrs / week
Practicals: 2 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)
Term Work : 25 Marks

Unit I

Introduction to the control system, Servomechanisms, History and Development of Automatic Control, Digital Computer Control. Mathematical Models of Physical Systems, Differential Equations of Physical Systems, Transfer Functions, Block Diagram Algebra, Signal Flow Graph. Feedback and Non-feedback Systems, Reduction of Parameter Variations by Use of Feedback, Control Over System Dynamics by use of Feedback, Control of the Effects of Disturbance Signals by use of Feedback, Linearizing effect of Feedback, Regenerative Feedback.

Lectures 10, Marks 20

Unit II

Control system components: stepper motors, servomotors, synchros, and tachometer**.**
Standard Test Signals, Time Response of First and Second-order Systems, Steady-state Errors and Error Constants, Effect of Adding a Zero to a System, Design Specifications of Second-order Systems, Design Considerations for Higher-order Systems. The Concept of Stability, Necessary Conditions for Stability, Hurwitz Stability Criterion, Routh Stability Criterion, Relative Stability Analysis.

Lectures 10, Marks 20

Unit III

The Root Locus Concepts, Construction Root Loci, Root Contours, Systems with Transportation Lag, Sensitivity of the Roots of the Characteristic Equation, design of lead – lag compensator using Root locus. Effect of addition of poles and zeros on root locus

Lectures 10, Marks 20

Unit IV

Correlation between Time and Frequency Response, Polar Plots, Bode Plots, All-pass and Minimum-phase Systems, Log-magnitude versus Phase Plots. Nyquist Stability Criterion, Assessment of Relative Stability Using Nyquist Criterion. Design of Basic lead / lag compensators using Bode plot. Constant M and constant N circles

Lectures 10, Marks 20

Unit V

Concepts of State, State Variables and State Model, State Models for Linear Continuous-Time / Invariant Systems, State Variables and Linear Discrete-Time Systems, Diagonalization, Solution of State Equations, Concepts of Controllability and Observability, Pole Placement by State Feedback. Linear Approximation of Nonlinear Systems,
Introduction to Fuzzy Logic Control, Neural Networks, Robotic Control System. PI, PD, PID Controller. (Primary treatment only)

Lectures 10, Marks 20

References: -

1. I.J.Nagrath and M. Gopal - Control System Engineering - New Age International Publisher. 4th Ed.
2. Katsuhiko Ogata - Morden Control Engineering - Pearson Education Publication, Fourth Edition.
3. Ashok Kumar - Control System - Tata McGraw-Hill Publishing Company.
4. R. Ananda and P. Ramesh Babu - Control System Engineering - SciTech Publications (India)

List of Practicals:

1) Determine Magnitude and phase plot of lead electrical network.
2) Determine Magnitude and phase plot of lag electrical network.
3) Determine transient response of RLC Electrical network.
4) Study AC position control of Servomotor.
5) Study DC position control of Servomotor.
6) Study of flow control using PID controller (Simulation)
7) Study of synchros to observe angular displacement.
8) Study of stepper motor
9) Study of tachometer

Note: Minimum **EIGHT** practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION, ELECTRICAL)
W.E.F : 2007- 08
TERM – I

ELECTROMAGNETIC ENGINEERING

Teaching scheme:
Lectures : 4 hrs / week
Tutorial : 1 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hrs)
Term Work : 25 Marks

UNIT I

Electrostatics:- Coulomb's law, Electric field due to line charge, Sheet charge and volume charge densities, Electric flux density, Gauss's law and Divergence theorem. Energy, Potential and Work-done, Potential gradient.Dipole and its electric field, Dipole movement. Energy density in electrostatic field.

Lectures 10, Marks 20

UNIT II

Conductor, Dielectrics and Capacitance:- Current and current density. Current continuity equation, Properties of conductors, Boundary conditions. Energy stored in capacitors, Poisson's and Laplace's equation's, Capacitance between parallel plates and co-axial cable using Laplace's equation.

Lectures 10, Marks 20

UNIT III

Magnetostatics:- Biot-Sarverts law and its vectorial form, Magnetic field due to infinitely long current carrying conductor ,Ampere's Circuital law. Application to co-axial cable. Curl operator, Magnetic flux density, Stoke's theorem. Scalar and Vector magnetic potential. Lorentz's Force equation. Energy stored in magnetic field. **Lectures 10, Marks 20**

UNIT IV

Time Varying Fields:- Faradays law , Maxwell's equations (Differential , Integral and Phasor forms). Uniform plane waves. Representation of wave motion in free space, perfect dielectrics and Lossy dielectrics (Wave equations). Poyinting Theorem and Power density. Propagation in good conductor and Skin effect. Reflection of Uniform plane waves. VSWR.
Transmission Line: - Impedance matching ,Single stub and Double stub transmission line. Introduction to Smith Chart.

Lectures 10, Marks 20

UNIT V

Radiation and antennas: - Radiation resistance. Radiation pattern. Calculation of Radiation resistance for short dipole, Short monopole, Half-wave dipole and Quarter-wave monopole antennas. Directivity, Reciprocity between Transmitting and Receiving antennas, Hertzian dipole, Vector retarded potential.
Types of Antennas: - Folded dipole, Yagi-uda, Horn antenna, Parabolic and Cassegrain feed antenna. Broadside, End fire, Binomial, Tchebysheff antenna arrays. Principle pattern multiplication, General pattern of two isotropic radiators. **Lectures 10, Marks 20**

References:

1) W. Hayt - Engineering Electromagnetics , TMH. (5th or 7th edition).
2) K. D. Prasad - Antenna and Wave Propagation, Satya Prakashan.
3) Guru and Hizirogli - Electromagnetic field theory fundamental, Thomson Publication
4) Narayan Rao - Basic Electromagnetics with application, PHI
5) J D Kraus - Electromagnetics, MGH ,4th edition.

Termwork:- Assignment will be based on the problems on **EACH** unit . (min.**FIVE** Assignments).

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I
DIGITAL COMMUNICATION

Teaching scheme:	**Examination scheme:**
Lectures : 4 hrs / week	**Theory Paper : 100 Marks (3 Hours)**
Practicals : 2 hrs / week	**Term Work : 25 Marks**
	Practicals : 25 Marks

UNIT I

Spectral Analysis and Sampling :- Fourier series and fundamentals, The Fourier transform, signal spectra, Energy density spectrum, Power density spectrum, Auto and cross correlation functions, properties of Fourier transform, Parseval's theorem, Rayleigh Energy theorem, LTI system response and distortion less transmission, Band limited and time limited signals, sampling theorem in frequency domain and time domain, Nyquist criteria, Reconstruction using inter polation filters, Ideal, natural, flat top sampling, Aperture effect,

Lectures 10, Marks 20

UNIT II

Random Variables and Processes :- Probability theory fundamentals, Bays theorem, Random variables, discrete and continuous random variables, probability density function, cumulative distribution function properties, standard models like Poisson, Binomial, Rayleigh, Gaussian,UDF. Central limit theorem, Mean moment, variance.

Random Processes: Mathematical definition, stationary process, Mean, correlation, co-variance function, Ergodic process, transmission of random process through LTI filter, Gaussian process, power spectral density, Noise , Narrow band noise.

Lectures 10, Marks 20

Unit III

Waveform Coding and Synchronization : Pulse code modulation; PCM generation and reconstruction, Quantization, Quantization error , Non – uniform Quantization and companding – PCM with noise Error threshold. Delta modulation, Delta- sigma modulation , Adaptive delta modulation, Differential PCM – LPC speech synthesis. Data encoding formats, Digital Multiplexers. ISI, Eye diagram , Bit synchronizer, Early late synchronizer , scrambling and un scrambling , carrier recovery.

Lectures 10, Marks 20

UNIT IV

Digital Continuous Wave Modulation Technique : Introduction BPSK, Differential PSK, DEPSK, Quadrature PSK, M- ary PSK, Quadrature Amplitude shift keying, Binary frequency shift keying , minimum shift keying, GMSK, $\pi / 4$ QPSK.

NON-coherent detection of FSK, DPSK, QPSK, calculation of error probability of BPSK and BFSK.

Lectures 10, Marks 20

UNIT V

Performance Analysis of Digital Signals and Spread Spectrum. : Baseband signal receiver, probability of error, optimum filter, White noise - matched filter. Properties, probability of error of match filter. Spread spectrum: PN sequence DSSS with coherent BPSK, signal space representation and processing Gain, Probability of error, Frequency hopped spread spectrum. Introduction to multiple Access Techniques: TDMA, FDMA and CDMA.

Lectures 10, Marks 20

References :

1) A B Carlson – Communication Systems (MGH 4th Edition)
2) Simon – Digital Communication Techniques , PHI
3) Amitabh Bhattacharya – Digital Communication (TMH)
4) Taub and Schilling – Principle of Communication Systems (TMH) 2nd ed
5) Das Mullick, Chatterjee – Principle of Digital Communication (New Age)
6) Proakis – Digital Communication (MGH 4 th Edition)
7) S.K.Venkataram - Digital Communication , S. Chand

List of Practicals

1) Verification of sampling theorem. PAM techniques. (Flat top and natural sampling) Effect of variable sampling rate, filter cut off , reconstruction of original signal using filter , aliasing effect
2) Study of DM , ADM , Techniques ,observation of effect of slope over load , granular noise and SNR measurement
3) Companded PCM (using A- Law) Plot quantization curve. SNR measurement ,
4) Generation and reception of QPSK in presence of noise
5) Generation and detection of FSK
6) Generation and detection of Quadrature Amplitude shift keyng
7) Study of line codes (NRZ, RZ, polar RZ, bi polar (AMI), Manchester) and spectral analysis
8) Generation and detection of DSSS coherent BPSK and spectral analysis.
9) Noise analysis using any software tool (use of any discrete distribution). Find response by changing parameters
10) Noise analysis using any software tool (use of any continuous distribution). Find response by changing parameters

Note: Minimum **EIGHT** practicals are to be performed, out of which minimum **TWO** practical using software tools are compulsory

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I

MICROPROCESSOR AND MICROCONTROLLER SYSTEM

Teaching scheme:	**Examination scheme:**
Lectures : 4 hrs / week	**Theory Paper : 100 Marks (3 Hours)**
Practicals : 2 hrs / week	**Term Work : 25 Marks**
	Practical : 50 Marks

UNIT I

Introduction to microprocessor and microcomputer system, functional pin diagram and detailed architecture of 8085 microprocessor, Demultiplexing of address / data bus, Generation of control signals, Instruction Set, Addressing modes. Programming for arithmetic and logical operation. Subroutine concepts.

Lectures 10, Marks 20

UNIT II

Functional pin diagram and architecture of 8031 / 51 microcontroller, Port structure, Instruction Set and assembly language programming.

Lectures 10, Marks 20

UNIT III

Timer / counter, modes of operation, Programming timer / counter.
Interrupt structure and Interrupts programming.
Serial communication programming in 8051 (only Standard 8-Bit UART Mode).
Memory interfacing (RAM, ROM, EPROM) - Basic concept in memory interfacing and address decoding.

Lectures 10, Marks 20

UNIT IV

Programmable Peripheral Interface (8255) – Block diagram, control words and modes and Interfacing.
Interfacing to external RAM and ROM, LED, Switch, 7-Segment display, Multiplexed 7-Segment display, Matrix Key-Board, Liquid Crystal Display, DAC, ADC, Stepper Motor with programs.

Lectures 10, Marks 20

UNIT V

Buses and Protocols – RS 232, RS 485, I^2C, MODBUS, IEEE 488.
Interfacing to EEPROM 93C46 / 56 / 66, 24C16 / 32 / 64, RTC DS1307.
Conceptual study of various derivatives of 8051 microcontroller from different manufacturers like Atmel, Phillips etc. Introduction to PIC microcontroller.

Lectures 10, Marks 20

References:

1. Gaonkar - Microprocessor Architecture , PHI.
2. Kenneth J. Ayala - 8051 Microcontroller, PHI.
3. Mazidi and Mazidi - The 8051 Microcontroller and Embedded Systems, Pearson.2nd ed
4. Mike Predko - Programming and Customizing 8051 micro controller, TMH.

List of Practicals:

1. Study of 8051 / 8085 assembler and Simulator.
    a) This is to be studied by writing program for addition / subtraction, multiplication / division.
    b) Executing external memory related instructions using MOVC / MOVX instruction (8051 only) *OR* Executing input / output or memory mapped input output related instructions (8085 only)
2. Writing a program which involves following any **TWO** (one using 8051and one using 8085):
    a) Celsius to Fahrenheit or Fahrenheit to Celsius conversion.
    b) Calculation of factorial.
    c) Multiple digit BCD arithmetic.
3. Write and Execute program to flash LED.
4. Write and Execute program to display 0 to 9 continuously on 7-Segment display,
5. Write and Execute program to demonstrate interfacing of 4 X 4 matrix Key-Board.
6. Write and Execute program to demonstrate interfacing of multiplexed 7-Segment display.
7. Write and Execute program to demonstrate interfacing of Liquid Crystal display.
8. Write and Execute program to demonstrate interfacing of DAC.
9. Write and Execute program to demonstrate interfacing of ADC.
10. Write and Execute program to demonstrate interfacing of Stepper Motor.
11. Write and Execute program to demonstrate Serial data Transmission.
12. Write and Execute program to demonstrate Serial data Reception.
13. Write and Execute program to demonstrate interfacing of Serial EEPROM 93C14 / 56 / 66 or 24C16 / 32 / 64.
14. Write and Execute program to demonstrate interfacing of RTC DS1307.

Note:

1. Experiments 3 to 14 should be performed with 8051 / 89c51 / 89c51RD2 kits using Assembler and downloading program.
2. Minimum **EIGHT** practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM - I
NETWORK ANALYSIS AND SYNTHESIS

Teaching scheme:
Lectures : 4 hrs / week
Practical : 2 hrs / week
Tutorial : 1 hr / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours).
Term Work : 25 Marks
Practical : 25 Marks

UNIT I

Concept of complex frequency, Characteristics of signals, standard signals, Laplace transform: Definition, Advantages in Network Analysis , Laplace Transform of waveforms , Network Analysis using Laplace Transform, Mesh Analysis. Node analysis , Thevenin Theorem and Nortons Theorem, Initial and final value theorem System Function, Impulse and state response of networks. , illustrative examples.

Lectures 10, Marks 20

UNIT II

System and Network Functions : Driving point admittance and impedance- Transfer impedance and admittance, voltages and current transfer Ratio, illustrative examples.
Natural frequencies, Poles and zeros in Network functions, significance of poles and zeros. Necessary conditions of driving point function and transfer function. Network with OP-Amps, Time domain behavior from poles and zeros plot in S domain.

Lectures 10, Marks 20

UNIT III

Two Port Networks Parameters: Z Parameter, Y parameter, h – parameter, ABCD parameter, Equivalent circuit using these parameters. Condition for reciprocity and symmetry of two port network in different parameters. Interconnection of two port networks. Cascade connection of two port networks parallel connection of two port networks. Series and series parallel connections. Inter conversion of parameters.

Lectures 10, Marks 20

UNIT IV

Synthesis of One and Two Port Networks : Hurwitz polynomials, positive Real functions. Synthesis of one port networks. Properties of LC immittance function, synthesis of LC driving point immittance, properties of RC driving point impedance or RL admittance, properties of RL impedances and RC admittances. Synthesis of RL , RC , LC , RLC functions. Synthesis in all Cauer / Foster form
Elements of Transfer function synthesis. Transfer function synthesis of two port networks.
Properties of transfer functions, zeros of transmission . synthesis of Y_{21} and Z_{21} and synthesis of constant resistance network.

Lectures 10, Marks 20

UNIT V

Filter Design: Frequency domain approximation of ideal low pass filter, Butterworth approximation, Tchebyshev approximation, synthesis of low pass filter, magnitude and frequency normalization,

frequency transformation to generate high pass, band pass filter and band elimination filter from normalized LPF.

Lectures 10, Marks 20

References:

1) Van- Vakenberg - Introduction to Modern Network Synthesis , PHI / Pearson 3rd ed
2) Franklin Kuo - Network Analysis and Synthesis
3) J Michael Jacob - Application of Design with Analog Integrated circuit , PHI 2nd ed
4) Gobind Daryanani - Principles of Active Network Synthesis and Design , Wiley
5) C P Kuriakose - Circuit Theory ; Elements of Network System , PHI
6) D Roy Chaudhary - Network and System , New Age
7) V K Atre - Network Theory and Filter Design, New age

List of practicals

1) Verify the Thevenin's theorem for given two port reactive circuit.
2) Determine transfer / driving point Impedance of given Two port reactive N/w.
3) Determine voltage and current transfer function of a given two port reactive N/w.
4) Determine pole - zero plot of given one port reactive N/w.
5) Determine Z parameter of networks connected in series.
6) Determine Y parameter of networks connected in parallel
7) Determine transmission parameter of networks connected in cascaded form.
8) Design and test low pass Butterworth filter
9) Design and test high pass Butterworth filter
10) Design and test low pass Tchebyshev filter

Note :- Minimum **EIGHT** practicals are to be performed..

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS , ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I

SOFTWARE APPLICATION -II

Teaching scheme:
Practical : 2 hrs / week

Examination scheme:
Term Work : 25 Marks

Objectives:
Introduction to the various software tools in the design, simulation and testing of electronics circuits.

Section A:
Simulation of analog circuits using any software tool:

1) To find voltage and current of the given network using simulation tool.
2) To find transfer / Driving point impedance of two port network.
3) To design and test active filter.
4) Frequency domain analysis of given filter.

Section B:
Simulation of control system using any software tool:

1) To find the pole zero plot of the given network.
2) To find the polar / Nyquist plot of the given network.
3) To design and check any control system.
4) To obtain transient response and characteristics of any given network.

Section C:
Simulation of Radiation Patterns using any software tool:

To find the radiation pattern any four types of antennas and study the effects of varying parameters.

Note: Minimum **SIX** assignments, **TWO** from **EACH** section.

References :

i. RASHID - PSPICE
ii. Stephen Chapman - Matlab programming for Engineer, Thomson.
iii. Manuals / Books of concern software tools.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I I
ELECTRONICS MEASUREMENTS

Teaching scheme:
Lectures : 4 hrs / week
Practical : 2 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours).
Term Work : 25 Marks

UNIT I
Analog instruments:
LCR-Q meter, True RMS meter, vector voltmeter, RF power and voltage measurement, Electronic multimeter, Amplified DC meter, AC voltmeter using rectifiers, Vector impedance meter, Output power meter, Field strength meter, Automatic bridge transmitter, Analog Ph meter, Bolometer method for power measurement.

Lectures 08, Marks 20

UNIT II
Digital Instruments
Microprocessor controlled bridges, Digital Readout Bridges, Digital counters and timers, Basic counter circuitry, main gate, Time base control circuit, Frequency measurement, measurement errors, Ratio of frequency measurement, Automation in digital instruments (Auto zeroing, auto polarity etc), Digital tachometer, Digital Ph meter, Phase meter, capacitance meter

Lectures 08, Marks 20

UNIT III
Signal Generators and Analyzers:-
Sine wave generator, Fixed Frequency AF Oscillator, Frequency synthesized signal generator, Random noise generator, sweep generator, Sweep marker generator, Colour bar generator, Vectroscope, Function generator.
Basic wave analyzer, Frequency selective wave analyzer, heterodyne wave analyzer, harmonic distortion analyzer, spectrum analyzer, Digital Fourier analyzer, logic analyzer, signature analyzer, OTDR meter, Wobbuloscope.

Lectures 10, Marks 20

UNIT IV
Oscilloscope:-
Introduction, principle, feature, block diagram, vertical amplifier, sweep types , delay line types , CRT diagram, CRT basics, PDA Tubes, dual beam CRO, dual trace CRO, VHF oscilloscope , VLF signal scope (analog storage and digital storage scopes), digital read out scopes, probes for CRO, attenuators, applications of CRO, fiber optic CRT, recording oscilloscope, hall effect probe , power scope.

Lectures 14, Marks 20

UNIT V
Data Aquisition, Conversion and Transmission:
Instrumentation system, interfacing transducer to electronic control, objectives of DAS , single channel multi channel DAS, ATS, computer based testing of audio amplifier ,radio receiver, data loggers, digital transducers. Data transmission systems, advantages and disadvantages of digital over analog transmitter, TDM, etc.

References:

1) Helfrick and Cooper – Modern Electronics Instrumentation and Measurement Techniques , Pearson
2) Deoblin – Measurements systems: Applications and Design , TMH 5th ed
3) Nakra , Choudhari -- Instrumentation Measurements and analysis , 2/E TMH
4) H. S. Kalsi – Electronics Instrumentation, TMH 2nd ed

List of Practicals :

1) Measurement of reactive and resistive components with LCR Q meter.
2) Study of true RMS meter / DMM for measurement of EMS value of any AC signal.
3) Measurement of frequency Time with the help of frequency counter.
4) Study of Digital Tacho meter for measurement of motor speed .
5) Measurement of distortion and nature of distortion by harmonic distortion analyzer.
6) Study of spectrum analyzer for its application.
7) Measurement techniques using CRO (frequency, amplitude, phase, time and component tester).
8) Study of DSO to measure and store frequency and amplitude.
9) Study of DATA loggers for various parameter measurement.
10) Study of computerized analysis of radio receiver and measurement of power with it.
11) Study of ATS

Note :- Minimum **EIGHT** practicals are to be performed.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION ENGINEERING)
W.E.F 2007 –2008
TERM – II
POWER ELECTRONICS

Teaching scheme:
Lectures: 4 hrs / week
Practical: 2 hrs / week

Examination scheme:
Theory Paper: 100 Marks (3 Hours)
Term Work: 25 Marks
Practical: 25 Marks

UNIT I

Power Devices : S.C.R. Structure, characteristics, transistor Analogy , ratings, R , RC, UJT Triggering, dv / dt and di / dt protection. Structure and characteristics of IGBT, GTO, FCT, MCT, Electrically isolated drive circuit for IGBT and MOSFET.

Lectures 10, Marks 20

UNIT II

Line Frequency Controlled Rectifiers : Natural and Line commutation, single phase, Half and full controlled bridge rectifier with R load, Circuit diagram, waveforms, average load voltage, efficiency, Ripple factor, Form factor. Single phase Half and fully controlled bridge rectifiers with inductive load, circuit waveforms, average output voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, Effect of source inductance. 3 - ϕ Half and fully controlled bridge rectifier with highly inductive load, circuit, operation and waveform, derivation of average and rms load voltage.

Lectures 10, Marks 20

UNIT III

DC – DC Converter Control of dc - dc- converter, step – down and step - up dc-dc converter, circuit diagram, waveform, output voltage calculations. Continuous conduction mode, boundary between continuous and discontinuous conduction.

Full bridge dc-dc converter– PWM Bipolar voltage switching. Switch mode power supply – Block diagram , control of SMPS – voltage feed forward control, current mode control, power supply protection. Electrical isolation in feedback loops.

Lectures 10, Marks 20

UNIT IV

DC – AC Inverters: Parallel inverters, principle of operation, 1 – ϕ Half bridge and full bridge inverters with R and R-L load, square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio. Harmonic analysis of square and quasi – square waveform, Harmonic load current, Harmonic reduction.

3 - ϕ Bridge inverter with balanced star resistive load, 120 degree and 180 degree conduction sinusoidal PWM switching scheme and Harmonic spectrum.

Lectures 10, Marks 20

UNIT V

AC Controllers and Application Principle of integral cycle and phase angle control**.** 1 ϕ Half wave and full wave AC control with R and R -L load, derivation of output Voltage. 3 - ϕ Half and full wave

AC control, circuit diagram, waveforms and operation.UPS- configurations, Battery- Ah, back up time and battery charger rating calculations. Study of speed control of DC motor, speed control of AC motor.

Lectures 10, Marks 20

References:

1. M.H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e . Or Pearson
2. Ned Mohan, T.M. Undeland and W.P. Robbins- Power Electronics, converters , Application, and Design , John willey and sons , 3/e
3. M.S. Jamil Asgar, - Power Electronics , PHI, 2004, New Delhi.
4. S.K. Bhattacharya - Industrial Electronics and control , Tata Mc-graw-Hill (TMH)
5. M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
6. M.D. Singh , K.B. Khanchandi - Power Electronics, TMH
7. Deodatta Shingare , Industrial and Power Electronics, Electrotech Pub.

LIST OF Practicals :

Group A

1) Study of R , RC and UJT triggering circuits of SCR to plot waveforms for various values of firing angle..
2) Implement optically isolated driver circuit for IGBT and MOSFET.
3) Study of 1 - ϕ Half controlled Bridge rectifier with R and RL Load , plot input and output voltage waveforms ,average load voltage v/s firing angle.
4) Study of 1- ϕ full controlled bridge converter with R and R-L load , plot input and output voltage waveforms ,average load voltage v/s firing angle.
5) Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
6) Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
7) Plot characteristics of IGBT, GTO .

Group B

8) Find Line and load regulation of SMPS.
9) Study of Parallel Inverter and find efficiency.
10) Study of I- ϕ full bridge inverter and find efficiency.
11) Study of 3- ϕ Bridge inverter and find efficiency.
12) Study of UPS
13) Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles
14) Study of 3- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles

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Note :- Minimum **EIGHT** practicals are to be performed.(Minimum **FOUR** practicals from **EACH** group)

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T.E. (ELECTRONICS, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)
W.E.F : 2007- 08
TERM – I I
ELECTRONICS CIRCUIT DESIGN

Teaching scheme:	**Examination scheme:**
Lectures : 4 hrs / week	**Theory Paper : 100 Marks (3 Hours)**
Practicals : 2 hrs / week	**Term Work : 25 Marks**
Tutorial : 1 hr / week	**Practical : 50 Marks**

UNIT I

Design of Power Supplies : Design of Unregulated power supply , selection of transformer, diodes, capacitors , calculation of surge resistance (using bridge rectifier) Design of Discrete series regulated power supply with protection circuit , design of regulated power supply using IC LM- 340 series, design of Dual power supply using LM-317 and LM 337 IC's., Design of switching regulators , Buck regulator , Boost regulator, and Buck – Boost using switching regulator IC – LM 1577 / 2577 . Heat sink calculations for power supplies.

Lectures 10, Marks 20

UNIT II

Design of Small Signal (Voltage) Amplifier BJT / FET : Design of Bias circuits (BJT / FET) Design of single stage amplifiers (CE / CS , CG / CB / CC / CD) Use of negative feedback : feedback amplifier design. Designing of negative feedback amplifiers : voltage series , voltage shunt, current series, current shunt

Lectures 10, Marks 20

UNIT III

Design of Large Signal (power) Amplifiers: Class - A, class - B, Class - AB , Push-pull amplifier, complementary symmetry amplifiers , Monolithic power amplifier design using IC LM-379.

Lectures 10, Marks 20

UNIT IV

Design of High Frequency Amplifier : Design of Tuned amplifier BJT / FET single tuned , double tuned. Use of auto transformer (Tapped - inductor) High frequency, cascode amplifier. Design of oscillator circuits : Clapp, Colpitt , Hartley oscillaotor, Design of switching circuits: Astable multivibrator, Monostable multivibrator, Bistable multivibrator.

Lectures 10, Marks 20

UNIT V

Design using Analog Integrated Circuits. : Single supply amplifiers (AC inverting, AC Non inverting amplifiers) , instrumentation amplifier AD – 620 , V - I converter, I - V converter, V - F, F - V, converters.

Current amplifiers. Design of Non-linear circuits: Voltage comparators , peak detectors. , True RMS converter. Sallen-key active filter design: Second order Sallen-key low pass, high pass, band pass, band reject, unity gain and equal component circuit design for Butterworth, Chebyshev response. Higher order filter design.

Lectures 10, Marks 20

References:

1) M.M. Shah - Design of Electronics Circuits and Computer Aided Design , Wiley Eastem
2) Goyal , Khetan - Monograph on Electronics Design Principles , Khanna Pub.

3) Michael Jacob - Application and Design with Analog Integrated Circuits , PHI 2/e
4) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH , 3/e.
5) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e
6) Martin S Roden , Gordon – Electronics Design ,Shroff Pub. - 4/e.
7) Bell – Solid State Pulse Circuits , PHI 4/e
8) K.V.Ramanan - Functional Electronics, TMH

LIST OF Practicals :

UNIT – I

1) Design of Regulated power supply.
    a) Transformer selection.
    b) Rectifier (Bridge)
    c) Filter Designing (Capacitor)
    d) Transistor series Regulator (Feedback type) with current protection circuit (or) Design of Regulated power supply using IC LM 340 series.
2) Design of switching regulator circuit using switching Regulator IC LM1577 / 2577

UNIT – II

3) Design of single stage amplifier circuits using BJT / FET
    a) Inverting / non inverting amplifier.
    b) Self bias for BJT and potential divider for FET.
    c) Calculation of Performance parameters like A_v, R_i and R_o
4) Design Test and verify the negative feedback amplifier circuits using BJT / FET
    a) Design biasing network
    b) Feedback network
    c) Calculation of performance parameters like A_{vf}, R_{if} and R_{of}

UNIT – III

5) Design and Testing of monolithic power amplifier using IC LM 379
    a) Designing of External Components required.
    b) Measurement of output power.
6) Design of Transformer less class B push pull amplifier using BJT. For
    a) With cross over Distortion.
    b) Elimination of Cross over distortion.

UNIT – IV

7) Design the single stage tuned amplifier using BJT / FET for given center frequency.
    a) Design of biasing circuit
    b) Designing of tuned circuit
    c) Calculations and verification of f_o and Bandwidth.
8) Design of Astable multivibrator using BJT
    a) Selection of Transistor
    b) Design of all external components.
    c) Calculation and verification of desired output frequency and amplitude of output voltage.

UNIT – V

9) Design of Inverting / Non inverting single supply amplifier using LM 324
    a) Designing of Biasing circuits
    b) Verification of the given gain and input impedance.
10) Designing of Instrumentation Amplifier using AD 620
    a) Designing of External components for given value of gain.

    OR

    Design of voltage to frequency converters using IC AD 537 for given requirements and verification of the same.
11) Design and test a sallen – key second order low pass / high pass filter for given specifications.
12) Design and test a sallen – key second order band pass filter for given specifications.

NOTE : 1) Minimum **FIVE** practicals are to be performed ,at least **ONE** from **EACH** unit.
2) **EACH** experiments should be carried out in **TWO** turns. In **FIRST** turn designing calculations are expected and in **SECOND** turn a complete circuit or major part of it be implemented.
3) Design using BJT must be carried out using h- parameters only.

NORTH MAHARASHTRA UNIVERSITY JALGAON

T.E. (ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)

W.E.F : 2007- 08

TERM – I I

INFORMATION THEORY AND CODING TECHNIQUES

Teaching scheme:	**Examination scheme:**
Lectures : 4 hrs / week	**Theory Paper : 100 Marks (3 Hours)**
Tutorial : 1 hrs / week	**Term Work : 25 Marks**

UNIT I

Information Theory and Channel Capacity : Introduction , Uncertainty, Information and Entropy, source coding theorem, Shannan fano algorithm data compaction, Discrete memory less channels, Mutual Information, channel capacity, channel coding theorem, differential entropy and mutual information for continuous ensembles . Information capacity theorem, Implication of the information capacity theorem, information capacity of colored noise channels, rate distortion theory, data compression.

Lectures 10, Marks 20

UNIT II

Error Control Coding : Introductions to error correcting codes, basic definitions, matrix description of linear block codes, equivalent codes . Parity check matrix, decoding of linear block codes, syndrome decoding , error probability after coding , perfect codes, hamming codes , optimal linear codes , maximum distance separable codes. Introduction to cyclic codes polynomials. The division algorithm for generating cyclic codes, matrix description of cyclic codes, Burst error correction, fire codes, golay codes, Cyclic Redundancy check codes, circuit implementation of cyclic codes . FEC and ARQ systems.

Lectures 10, Marks 20

UNIT III

Convolutional Codes and Coding Methods : Introduction to convolutional codes, Tree codes and trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, Generating functions, Matrix Description of convolutional codes, viterbi Decoding of convolutional codes, distance bounds for convolutional codes, Turbo codes, Turbo decoding, Introduction to TCM , concept of coded modulation. Mapping by set partitioning, ungerboecks TCM design rules, TCM decoder Performance evaluation for AWGN channel. Burst error correcting Codes,

Lectures 10, Marks 20

UNIT IV

Application of Information Theory : Introduction to BCH codes, primitive elements, Minimal polynomials, Generate polynomials in terms of Minimal polynomials, same examples of BCH codes, Reed solemen codes, implementation of Reed Solomon encoders and decoders. Data compression. Introduction to data compression, The JPEG standards for loss less compression. Introduction to crypto graphy. Overview of encryption Techniques. RS algorithm, application of information theory. An optimum modulation system. Comparison of Amplitude modulation system with optimum system. Feedback communication system.

Lectures 10, Marks 20

UNIT V

Communication Link Design : Introduction to multi-user radio communications . Multiple Access Techniques. Introduction to satellite communication , Radio link analysis, wireless communication ,

statistical characteristics of multipath channels. Binary signaling, Over a Rayleigh fading channel . TDMA and CDMA wireless communication systems, wireless standards IS 95.

Lectures 10, Marks 20

References:

1. Ranjan Bose - Information Theory Coding and Cryptography, TMH
2) Taub and Schilling - Principle of Communication Systems, (TMH) 2nd edition.
3) J. Das , K Mulik, P.K. Chatterjee - Principle of Digital Communication , (New Age Int.)
4) Theodore S. Rappaport - Wireless Communication – Principles and practice ,(Pearson Ed) 2nd Ed..
5) J.G. Proakis - Digital Communications, (MGH), 4th Ed.

Note: - Assignment will be based on the problems on **EACH** unit . (min.**FIVE** Assignment)

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TERM – I I

ANALOG INTEGRATED CIRCUITS AND APPLICATIONS

Teaching scheme:
Lectures : 4 hrs / week
Practicals : 2 hrs / week

Examination scheme:
Theory Paper : 100 Marks (3 Hours)
Term Work : 25 Marks
Practicals : 25 Marks

UNIT I
Op-amp Basics

Block diagram of op-amp, differential amplifier, various configurations, dc and ac analysis, constant current bias circuits, current mirror, active load, dc level shifter, output stage, op-amp symbol, packages, 741 op-amp pin diagram, overview of general purpose and special purpose op-amp, their peculiarities and application areas, FET op-amp, MOSFET op-amp.

DC parameters: definitions and typical values, input bias current, input offset current, input offset voltage, offset voltage and bias current compensation, thermal drift, A.C. parameters: frequency response, stability of op-amp, frequency compensation, internally compensated op-amp, slew rate, its effect on op-amp output, gain bandwidth product, rise time, full power bandwidth, CMRR, SVRR, open loop and close loop operation of op-amp, ideal op-amp, practical op-amp, inverting and non inverting amplifier, and analysis using ideal and practical op-amp, concept of virtual ground.

Lectures 10, Marks 20

UNIT II
Op-amp Applications

Voltage follower, difference amplifier, summing amplifier, substractor, adder-substractor, peaking amplifier, instrumentation amplifier using 3 op-amp and its applications, linearization, isolation techniques, monolithic instrumentation op-amp IC AD 5219 (pin and functional diagram), ac amplifier, dc amplifier, V to I (floating and grounded load) and I to V converter, its applications, integrator and differentiator, their practical considerations.

Half wave and full wave Precision rectifiers, clipper, positive and negative clamper, peak detector, sample and hold circuit, IC LF398 (pin and functional diagram), log and antilog amplifier, Analog multiplier and divider.

Lectures 10, Marks 20

UNIT III
Comparators and Signal Generators

Inverting and non inverting comparator, zero crossing detector, window detector, Schmitt trigger, its advantages, limitation of op-amp as comparator, comparator IC study LM311, introduction to OTA.

Square wave generator, monostable multivibrator, triangular wave and sawtooth wave generator, sine wave generator, phase shift oscillator, Wien bridge oscillator.

Timer IC 555: Functional diagram, monostable operation, astable operation, applications. Function generator IC 8038.

Lectures 10, Marks 20

UNIT IV
PLL and Audio Power Amplifiers

V to F converter, IC AD537. F to V converter, IC LM 2917. PLL: basic principles, block schematic,

phase detector, low pass filter, VCO IC 566, transfer characteristics, free running frequency, lock range, capture range, pull in time, PLL IC 565, block diagram, circuit connection, PLL application: frequency synthesis, FM demodulator, AM demodulator, FSK demodulator.
Audio power amplifier: LM380 specifications, features, applications, features of other amplifier such as LM384, LM 377, LM810.RF and IF amplifier IC.

Lectures 10, Marks 20

UNIT V

Active Filters, D to A and A to D Converter

Active filter: Butter worth low pass, high pass, band pass and band reject filter, first order and second order filter design, frequency scaling.
DAC Specifications: resolution, offset error, gains error. Weighted resistor DAC, its disadvantages, R-2R ladder DAC, inverted R-2R ladder, AD 558.
ADC specification: resolution, quantization error, offset error, gain error, linearity error, conversion time. Flash ADC, counter type ADC, successive approximation type, integrating type ADC, dual slope ADC, AD670. Frequency response of ADC, sample and hold circuit.

Lectures 10, Marks 20

References:

1) D.Roy Chaudhary ,Shalil Jain- Linear Integrated Circuit, New Age International, 2/e.
2) Coughling,Driscoll - Op amps and Linear Integrated Circuits, Pearson education, 6/e
3) Ramakant Gaikward - Op amp and Integrated circuit, PHI
5) Sergio Franco - Design with Operational Amplifier and Analog Integrated Circuits , TMH- 3 / e
6) Botkar - Integrated circuits, Khanna Pub.

List of Practicals

Study of op-amp data sheets: LM 741, OP-07

1. Op-amp parameter measurement: input bias current, input offset current, input offset voltage, slew rate of op-amp 741.
2. Design and test active integrator and differentiator circuits for given frequency.
3. Study the operation of half wave and full wave precision rectifier.
4. Design and test positive and negative clamper.
5. Design and test Schmitt trigger circuit using LM 311 for given hysteresis.
6. Design and test of square wave and triangular and saw tooth wave generator using op-amp for given frequency.
7. Design and test timer using IC 555 in monostable and astable mode.
8. Design and test function generator using IC 8038.
9. Design and test PLL using IC 565 PLL for given lock and capture range.
10. Design and test audio amplifier using IC LM380 with and without positive feedback.
11. Setup DAC circuit Using IC AD 558 and study its performance
12. Setup ADC circuit Using IC AD 670 and study its performance
13. Design and test second order Butterworth LP / HP filter.
14. Design and test BP Butterworth filter.
15. Design and test BR Butterworth filter.

Note: Minimum **EIGHT** practicals are to be performed, at least **ONE** from each unit. All practical should be performed on **bread board**.

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TERM – I I

PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Teaching scheme: **Examination scheme:**
Practical : 2 hrs / week **Term Work : 25 Marks**

- Every student has to undergo industrial / practical training for a minimum period of two weeks either during summer vacation between (S.E Second Term) fourth term and (T.E. First Term) fifth term or during winter vacation between fifth term and sixth term (T.E. First Term and Second Term).

- The industry in which practical training is taken should be a medium or large scale industry

- The paper bound report on training must be submitted by every student in the beginning of (T.E. Second Term) sixth term along with a certificate from the company where the student took training.

- The report on training should be a detailed one.

- Maximum number of students allowed to take training in a company should be five. Every student should write the report separately.

- In case if a student is not able to undergo practical training, then such students should be asked to

  prepare special study report on a recent topic from reported literature .

  or

  prepare a mini project related to the Electronics / Electronic and Communication / Electronic and Telecommunication branch of engineering.

  1. The circuit for mini project must be designed by a student.

  2. The circuit should be simulated using any of the standard simulation software available.

  3. Result verification for paper design and simulation should be carried out and discrepancies should be discussed.

4. Verified circuit should be assembled and tested on general purpose PCB/ Protoboard for actual working and practical results.

5. Layout of circuit using standard Layout tool (Orcad / Protel / CADstar / Pads / Ultiboard) should be designed and PCB making process should be carried out.

6. Assemble and test the circuit on PCB. Prepare bill of materials.

7. Project report should be detail of work, carried out by student, including layouts, circuits, bill of materials and relevant details

- The practical training / special study / mini project shall carry a term work of 25 marks. Every student shall be required to present a seminar in the respective class in the presence of two teachers. These teachers (appointed by the head of department in consultation with the Principal) shall award marks based on the following:

(a) Report	10 marks.
(b) Seminar presentation	10 marks.
(c) Viva -voca at the time of Seminar presentation	05 marks.

Total	25 marks.