Faculty of Engineering & Technology

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

THIRD ENGINEERING (T.E.)

ELECTRONICS ENGINEERING
TERM – I & II

W.E.F 2007 - 2008

NORTH MAHARASHTRA UNIVERSITY, JALGAON
STRUCTURE OF TEACHING AND EVALUATION
T.E. (ELETCRONICS ENGINEERING)

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	Medical Electronics	4	--	2	3	100	25	25	--
2	# Electro Magnetic Engineering	4	1	--	3	100	25	--	--
3	*Feedback Control System	4	--	2	3	100	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	Mechatronics	4	--	2	3	100	25	25	--
2	*Electronics Measurements	4	--	2	3	100	25	-	--
3	*Electronic Circuit Design	4	1	2	3	100	25	50	--
4	*Analog Integrated Circuits and Applications	4	--	2	3	100	25	25	--
5	Electronics Communication	4	--	2	--	100	25	--	--
6	#Practical Training / Mini Project / Special Study	--	--	2	--	--	25	--	--
	Total	**20**	**1**	**12**	**--**	**500**	**150**	**100**	**--**
	Grand Total	**33**			**750**				

* Common with TE (Electronics & Communication / Electronics & Telecommunication)
# Common with TE (Electronics & Communication / Electronics & Telecommunication) and TE(Electrical)

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS)
W.E.F : 2007- 08
TERM - I
MEDICAL 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

Introduction to the Biomedical Instrumentation and Measurement:

Basics of biomedical Instrumentation system, Anatomy and Physiology of the Human Body: Cells and chromosomes, Generation of potential in Body, Body potential,

Bio-electrodes : Properties of Bioelectrodes , Different types of electrodes.

Transducers And Sensors: Transducers: Pressure transducers, transducer for temperature measurement, Ultrasonic Transducers, Sensors: Pulse sensors, Respiration sensors, Optical sensors;

Bioelectric Amplifiers: Operational amplifiers, Basic amplifier configurations, Multiple input circuits, Differential amplifiers, Signal processing circuits, Isolation amplifiers, Chopper amplifiers,

Recorder and displays: Permanent magnet moving coil instruments, PMMC writing system, X-Y Recorders, Medical oscilloscopes: Multibeam oscilloscope, Nonfade oscilloscope, Digital storage oscilloscopes.

Lectures 10, Marks 20

UNIT II

The Anatomy of Heart; Function of Heart:

The circulatory system, Electroconduction system of the heart; Electrocardiographs: ECG waveforms, Standard lead system, ECG measurements: ECG preamplifier, Readout device; Heart problems: Heart blocks; Pacemakers: Pacemakers, Types of Pacemakers; Defibrillators: Ventricular Fibrillation; Bedside monitor. Heart rate measurement: Cardiotachometers, Average Heart rate meter;

Lectures 10, Marks 20

UNIT III

The Human Nervous and Muscular System:

The Nervous System: The peripheral nervous system, Central nervous system; Anatomical and physiological parameter of brain, Behavior and Nervous system; Study of Brain Signals: Different wave form of the Brain, Evoked potential, Type of electrodes; EEG Amplifier: Recording the EEG signals; Artifacts: Processing Artifacts; Analysis of Disease using EEG and sleep patterns; Electromyography (EMG): How muscles work, paralysis, myograph, Nerve conduction velocity.

Lectures 10, Marks 20

UNIT IV

Human Respiratory System and Its Measurements:

Respiratory Measurements; Spirometer ; Respiratory gas analyzers , infra red gas analyzer , oxygen analyzer , nitrogen analyzer ;

Blood : Measurement of blood flow , Radiographic technique, Indicator Dye dilution methods, Thermal convection, Magnetic blood flow rate, Ultrasonic blood flow meter; Blood Pressure : Measurement of blood pressure, Blood gas analyzer, PH measurement of blood; Oximetry: Measurement of partial pressure of CO_2 in blood, Measurement of blood PaO_2, In vitro Oximetry.

Patient Safety:

Galvanic skin resistance, Lie detector; Patient safety: Macro shock, Macrocurrent shock;

Telemedicine and telemetry; physiological signals over telephone lines;

Lectures 10, Marks 20

UNIT V

Imaging Techniques *:* X ray imaging and CT Scan : Properties of X ray , Production of X ray , Application of X ray in medicine , CAT Scan , Xray therapy :

Magnetic Resonance Imaging (MRI) : MRI Procedure , Patient Safety , Benefits and risks and limitations of MRI ; Positron Emission Tomography (PET) : Scanning , Patient preparation test , PET Instrumentation system , Advantages of PET scan , risks , Single Photon emission computed tomography (SPECT), History of PET and advantages of PET scanning ;

Ultrasound in medicine : Physics of Ultrasound , Doppler Effect , Ultrasound imaging , A Scan display , B scan display , Multi array scanning , M mode scan.

Lectures 10, Marks 20

Reference Books

1) R.S.Khandpur - Bio-medical Instrumentation , TMH 2nd ed
2) Cromwell - Biomedical Instrumentation and Measurements, PHI. 2nd ed / Pearson 4th ed
3) Webster - Application and Design of Medical Instruments.
4) Joseph J. Carr and John M. Brown- Introduction to Biomedical Equipment Technology, Pearson. 4th ed
5) Nandini K. Jog - Electronics in Medicine and Biomedical Instrumentation, PHI.

List of Practical:

1) Study of Blood pressure measurement.(Non-invasive and simulation of invasive)
2) Study of ECG amplifier to measure amplitude and frequency components
3) Study of bedside monitors to measure temperature, blood pressure, ECG wave, respiration rate etc.
4) Study of measurement of pulse rate.
5) Study of measurement of Temperature of human body Direct and indirect method.
6) Study of EMG / EEG simulator and plot waveforms.
7) Record and monitor Heart sounds using e-stethoscope
8) Study of Pace Maker Unit to compare the operation of heart with the normal functioning of heart.
9) Study of Blood cell counter to measure cell counts.
10) Study of Spectrophotometer
11) Study of ultrasound in medicine.
12) Study of temperature telemetry system to measure the received data.

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, 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)
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..

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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) W. E.F : 2007- 08

TERM – I I

MECHATRONICS

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

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

UNIT I

Mechatronics, Mechatronics system components. Position speed and displacement transducer: proximity sensors- optical, inductive (through beam, reflective), capacitive and ultrasonic. Potentiometer, LVDT, Digital optical encoder- absolute encoder, incremental encoder, Limit switch, Reed relay, Hall effect sensors, Tachogenerator. Force and strain measurement: strain gauge, load cell. Temperature sensor: Bimetallic strips, RTD, Thermistors, Thermocouples. Pressure and flow measurement: diaphragms, bellows, bourdon tube, piezoelectric sensor. Liquid level measurement. Piezoelectric accelerometer

Lectures 10, Marks 20

UNIT II

Signal conditioning concept, Application of following op-amp circuits in conditioning the output of various transducers: inverting amplifier, non inverting amplifier, voltage follower as buffer, summing amplifier, substractor, integrator, differentiator, instrumentation amplifier, its application with Wien bridge and Wheatstone bridge for sensors, signal conditioning circuits for temperature sensors, temperature compensation, thermocouple compensation, logarithmic amplifier, its used for linearization, I to V converter as temperature to voltage converter, V to I converter, charge amplifier with piezoelectric transducer, sample and hold circuit, analog multiplexer, PWM circuit using comparators, zero crossing detector, window detector, optoisolator, V to F converter, F to V converter, impedance matching , grounding and electrical interference , electrical safety.

Lectures 10, Marks 20

UNIT III

Actuators and Mechanisms: Solid states switches, solenoids and relays, DC Motors, its control circuit, AC motors, Stepper motors, stepper motor control circuit, IC SAA1027, selection of motor.

Pneumatic actuators: pneumatic system components, cylinder, piston and valve, various linear actuators-single rod single acting, single rod double acting etc. Hydraulic actuation system component, Hydraulic valves and actuators. Mechanisms- bearing, belt, chain, pulleys, gears, gear ratio, rack and pinion, ratchet, pawl and crank, slinder and crank, cams and follower, chain and sprocket, Geneva wheel.

Lectures 10, Marks 20

UNIT IV

PLC: Block diagram, system components, operation of PLC, scan rate, ladder diagram, logical function, PLC wiring, internal relays, sequencers, flip-flops, timers, counters, shift register, Mnemonic programming, PLC power connection, various types of PLC input and output circuits, analogue I / O, selection of PLC, connecting sensors with PLC.

Lectures 10, Marks 20

UNIT V

Interfacing concept and requirements, TTL and CMOS integrated circuits, digital IC output configuration - totem pole, open collector, tristate, interfacing TTL and CMOS devices , interfacing BJT and MOSFET as switch (with LED, relay coil at collector) to micro controller, interfacing of input and output with micro controller 8051, seven segment display , key boards, stepper motor , DC Motor, solenoid valve , Pneumatic valves, A to D and D to A interfacing , Interfacing micro controller output to 4 to 20 mA transmitter, interfacing temperature transducer to micro controller via signal conditioning circuit.

Case studies: Pick and place robot, car-parking barriers.

Lectures 10, Marks 20

References:

1) Bolton - Mechatronics , Pearsons ,3/e.
2) Alciatore – Introduction to Mechatronics, TMH
3) Coughling, Driscoll - Op amps and Linear Integrated Circuits , Pearson education, 6/e
4) Mahalik – Mechatronics , TMH
5) Hackworth – Programmable Logic Controller, Pearson
6) Petruzella -- Indusrial Electronics , TMH

List of Practicals

1. Study the specification and operation of following transducer: Various types of Proximity sensors, Digital optical encoder, Limit switch, Reed relay. Hall Effect sensor.
2. Study the specification and operation of following transducer: Load cell, Thermisters, Thermocouples, Piezoelectric sensor.
3. Design and test the signal conditioning circuit for given transducer.
4. Design and test the signal conditioning circuit for given transducer.
5. Study the operation of Electro pneumatic actuation components and system.
6. Study the operation of Electro hydraulic actuation components and system.
7. Study the specification and operation of PLC and its programming.
8. Interfacing of input and output devices to PLC, such as: Proximity sensor,optical encoder,solenoid valves etc.
9. Interfacing of input and output devices to the microcontroller, such as: Proximity sensor,optical encoder,solenoid valves etc.

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 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.

Lectures 10, Marks 20

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

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

Examination scheme:
Theory Paper : 100 Marks (3 Hours)
Term Work : 25 Marks
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, ELECTRONICS & COMMUNICATION, ELECTRONICS & TELECOMMUNICATION)

W.E.F : 2007- 08

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, gain 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.

NORTH MAHARASHTRA UNIVERSITY JALGAON
T.E. (ELECTRONICS)
W.E.F : 2007- 08
TERM - II
ELECTRONICS COMMUNICATION

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

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

UNIT I

Introduction to Electronics Communication: -

Power measurements, electronics communication system, modulation and demodulation, EM spectrum, bandwidth and information capacity.

Signal analysis, complex waves, frequency, spectrum and bandwidth, linear summing, and non-linear summing,

Introduction to communication Networks.: Need, architecture, functions of architecture, inter connection concept, connection protocols, data communication circuits, and basic circuit networks components, OSI reference model.

Television fundamentals: Introduction, picture transmission, television transmitter, television receivers, synchronization, aspect ratio, image continuity, interlaced scanning

Lectures 08, Marks 20

UNIT II

Microwave Radio Communication and Systems:-

Introduction, advantages and disadvantages, analog vs. digital microwave, FM microwave radio system, radio repeaters, diversity, protection switching arrangements, FM microwave radio stations, repeater stations, line of sight path characteristic, microwave system gain.

RADAR: principles, block diagram, radar frequency, power used in radar, radar range equation , pulse radar system, antenna and scanning, display methods, Introduction to MTI and CW radar system.

Lectures 12, Marks 20

UNIT III

Telephone Instruments and Signals :-

Introduction, subscriber loop, standard telephone set, directivity of microphone, block diagram of Telephone set, basic telephone call producer, call progress tone and signals, DTMF, Caller ID system, cordless telephones, electronic telephones, paging systems,

Telephone circuit: - Introduction, , local loop, transmission parameters and private lines circuits, voice frequency circuit arrangements, cross talk, unit of power measurements., ECHO suppressors, and cancellers.

Lectures 08, Marks 20

UNIT IV

Public Switching Telephone Networks :-

Introduction, telephone transmitter system environment, public telephone network, trunk circuits and exchanges, switching routes, traffic management , automatic switches and exchanges, telephone services. Introduction to cellular telephone concepts , frequency, Reuse, splitting , handoff. IS 95 standard and GSM architecture only.

Lectures 10, Marks 20

UNIT V

Television Standards and Systems : -

Camera tube types, mono and colour cameras, mono and colour picture tubes, composite video signal.

Television systems and standards : NTSC, PAL, Mono chrome system.

Cable T.V :Introduction, signals sources, processing, distribution, bidirectional networks, converters, digital system hardware. Introduction to DTH, 3D T.V, EDTV, HDTV etc.

Lectures 12, Marks 20

References:

1) Mischa Schwartz – Telecommunication Networks: Protocols, Modeling and Analysis Pearsons
2) Vishwanathan – Telecommunication Switching Systems and Networks , PHI
3) Tomasi – Electronics Communication Systems, TMH, 5/e.
4) R.R Gulati- Modern Television Practice , New age, 2/e
5) TG Thomas – Communication Theory , TMH
6) R.G.Gupta – Audio Video System ,TMH

List of Practicals

1) Study of the Telephone Demonstrator to observe various signals, ringing patterns, spectrum analysis of DTMF frequencies.
2) Study of Black and White TV Trainer to observe and measure amplitude of signals at various points and spectrum observation.
3) Study of Color TV Trainer to observe composite video signal and various pattern observation of signals on screen.
4) Study of Satellite receiver Trainer for observation of signals, measurement of received frequencies and their spectrum mesurement at various points in trainer.
5) Application of EPABX as to use it as intercom,, programming in EPABX to study different facilities offered in EPABX such as no dial calls, call divert,call transfer etc. Measurement of signals at various level of communication.
6) Study of procedure of Television AF, RF, and sound alignment
8) Audio Signal Processing using graphic equalizers and active tone controllers.
9) To plot Directional pattern and gain measurement of YAGI ANTENNA, effect of number of directors.
10) To plot Directivity patterns of microphone and speakers.
11) Spectrum analysis of linear and non-linear signals using software tools.

Note :- Minimum EIGHT practicals are to be performed

NORTH MAHARASHTRA UNIVERSITY JALGAON
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W.E.F : 2007- 08
TERM – I I

PRACTICAL TRAINING / MINI PROJECT / SPECIAL STUDY

Teaching scheme:
Practical : 2 hrs / week

Examination scheme:
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.

T.E. (ELECTRONICS)

SR. NO.	OLD SUBJECTS	NEW SUBJECTS
1	NETWORK THEORY Term I	NETWORK ANALYISIS AND SYNTHESIS Term I
2	MICROPROCESSOR Term I	
3	CONTROL SYSTEMS Term I	FEEDBACK CONTROL SYSTEM Term I
4	ELECTRONIC COMMUNICATION - I Term I	
5	ELECTRONIC CIRCUITS DESIGN Term I	
6	LINEAR INTEGRATED CIRCUITS AND APPLICATIONS Term II	ANOLOG INTEGRATED CIRCUITS AND APPLICATIONS Term II
7	MICROPROCESSORS AND MICROCOMPUTERS Term II	
8	INDUSTRIAL ELECTRONICS Term II	
9	INDUSTRIAL MANAGEMENT Term II	MANAGEMENT SCIENCE at S.E. (E &C, E & T/c) Term II
10	MEDICAL ELECTRONICS Term II	MEDICAL ELECTRONICS Term I
11	Practical Training / Mini Project / Special Study Term II	Practical Training / Mini Project / Case Studies Term II
12		MICROPROCESSOR AND MICROCOLTROLLER SYSTEM Term I
13	ELECTROMAGNETIC ENGINEERING at S. E.(E &C, E & T/c) Term I	ELECTROMAGNETIC ENGINEERING Term I
14		SOFTWARE APPLICATION - II Term I
15		ELECTRONIC CIRCUIT DESIGN Term II
16		MECHATRONICS Term II
17	ELECTRONICS INSTRUMENTS AND MEASUREMENTS at B. E. (ELEX) Term I	ELECTRONICS MEASUREMENTS Term II
18		ELECTRONICS COMMUNICATION Term II

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