NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

TEACHER AND EXAMINER'S MANUAL

Semester – V

W.E.F 2014 – 2015

Electronic Circuit Design

Teacher, Paper setter and Examiner should follow the guidelines as given below.

For designing of circuits use methods / steps available only with reference books.

Unit - I

Teacher should facilitate design of unregulated and regulated power supply using discrete components and ICs.

1.	**Design of Power Supplies**		**Lecture required**	**Reference No**
	a	Design of half wave & full wave bridge rectifier with capacitor filter for given V_{out}, I_{out}, V_{ripple} / bridge factor. Selection of diode Peak inverse voltage (PIV) and forward current rating), capacitor (capacitance and voltage rating), Load resistor (resistance, wattage rating), transformer turn ratio.	01	2, 4
	b	Design of series voltage regulator (feedback type), Design of fold back type protection circuit. Improvement in stabilization factor of regulator with Darlington pair (Selection of transistors, resistors, zener diode)	03	1, 2, 4
	c	Design of single and dual adjustable power supply using LM317/337 with heat sink requirement (design also includes unregulated power supply- full wave, Capacitor filter only, limit output current to less than 1Amp)	02	1, 2, 7
	d	Design of buck and boost regulator using IC 2575/1575 and IC 2577/1577 for fixed output and adjustable output.	02	6, 7

Unit - II

Teacher should facilitate design of small signal amplifiers using BJT and JFET

2.	**Design of Small Signal Amplifiers using BJT / FET**		**Lecture required**	**Reference No**
	a	**Design of single stage CE and CS amplifier** (design of amplifier for given Av, Ri, Q points, Stability factor, Load Resistor, Vcc/V_{DD}, F_L, output voltage swing, transistor parameters)	02	1, 2, 4
	b	**Design of single stage CC and CD amplifier** (design of amplifier for given Ri, Rout, Q points, Stability factor, Load Resistor, Vcc/V_{DD}, F_L, transistor parameters)	02	1

	c	Design of single stage CB and CG amplifier (design of amplifier for given Av, Ri, Rout, Q points, Stability factor, load Resistor, Vcc/V_{DD}, F_L, transistor parameters)	02	1
	d	Design of current series negative feedback amplifier using BJT / JFET for given values of Avf, Rif, Rof, Gmf,	02	1

All design must be with exact formulas (for Av, Ri, Ro, Capacitor calculations etc, Do not use approximate formulas for design. Examiners have to set questions considering exact formulas.

Unit – III

Teacher should facilitate design of power and tuned amplifier circuits.

3.	**Power and Tuned Amplifiers**		**Lecture required**	**Reference No**
	a	Design of Class A Amplifier (resistive load and transformer coupled load) (design of amplifier for given Pout, RL, transformer efficiency)	02	1, 4
	b	Design of Class B amplifier, Design of Class AB amplifier (crossover distortion elimination) (design of amplifier for given Pout, RL, transformer efficiency, stability factor)	02	1, 4
	c	Design of single tuned amplifier using BJT & JFET (no theory questions)	04	2

Unit – IV

Teacher should facilitate design of oscillator circuits with BJT / JFET, design of multivibrators using BJT.

4.	**Design of Oscillators**		**Lecture required**	**Reference No**
	a	**Design RC and LC Oscillators** RC phase shift oscillator, Hartley, Colpitts and Clapp oscillator using BJT and JFET	04	1, 2

	b	**Design of Multivibrators** Design of collector coupled Astable multivibrator and collector coupled Monostable multivibrator using BJT	02	5
	c	Design of UJT relaxation Oscillator	01	5
	d	Design of Schmitt trigger using BJT	01	5

Unit - V

Teacher should facilitate design of circuits using opamp and special ICs

5.	**Design using Analog Integrated Circuits**		**Lecture required**	**Reference No**
	a	Design of single supply ac inverting and noninverting amplifier using IC324.	02	6
	b	**Applications of IC555** Design of FSK modulator using IC555,	01	3
		Design of ramp generator using IC555	01	
	c	Design of V/F and F/V convertors using TC9400	02	3
	d	Study of different ICs available for digital modulation techniques (PAM, PWM, PPI, ASK, FSK)	02	7

Reference Books:

1. David Bell - Electronics Devices and Circuits, PHI or Pearson 4/e.
2. Goyal, Khetan - Monograph on Electronics Design Principles, Khanna Pub.
3. Rashid – Microelectronics Circuits Analysis and Design, Cenage Learning, 2/e
4. M M Shah - Design of Electronics Circuits and Computer Aided Design , New Age Int.
5. Bell – Solid State Pulse Circuits, PHI 4/e
6. Michael Jacob - Application and Design with Analog Integrated Circuits , PHI 2/e
7. IC datasheets

Communication System -II

Teacher, Paper setter and Examiners should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Spectra, Probability and Random Variables.

1.	Spectra, Probability and Random Variables		Lecture required	Reference No
	a	Basic Signal Processing Operation In digital communication, Power density spectrum, Energy spectral density	01	01 &03
	b	Parseval's Power and Rayleigh Energy theorem **(proof)**	01	02
	c	**Probability and sample space(Numerical)** Probability and events, sample space and probability theory ,conditional probability and statistical independence	03	02
	d	**Random Variables, Random process** Discrete random variables and CDFs, continuous random variables and PDFs (Numerical only) Transformations of random variables, Joint and conditional PDFs, Statistical averages-Mean Moments and standard deviation. Random Process- Stationary and Ergodic processes **(only Theory).**	03	02
	e	**Probability Models-** Binomial distribution, Poisson distribution, Gaussian PDF.	01	02

Unit – II

Teacher should facilitate learning of Waveform Coding and Baseband Shaping for Data Transmission.

2.	Waveform Coding and Baseband Shaping for Data Transmission		Lecture required	Reference No
	a	**Pulse Code Modulation (Numerical)** Detail description of block diagram. Channel noise error probability. Quantization noise and signal to noise ratio. Robust quantization, variance of the quantization error.	02	01
	b	Differential pulse code modulation, Delta modulation, Adaptive Delta modulation. Digital Multiplexing, T1 system, M12 multiplexer.	02	01

	c	Discrete PAM Signals, power spectra of discrete PAM signals, RZ,NRZ polar unipolar format, NRZ Bipolar Manchester format, Inter symbol interference, Nyquist's Criterion for Distortion less Baseband Binary Transmission, ideal and practical solution, Eye Pattern	04	01

Unit – III

Teacher should facilitate learning of fundamental of Digital Modulation Techniques.

3.	**Digital Modulation Techniques**		**Lecture required**	**Reference No**
	a	Digital Modulation formats, **Coherent Binary Modulation Techniques-**Coherent Binary PSK,FSK(Generation, reconstruction, waveform, signal space diagram and error probability derivation)**(no numerical)**	03	01
	b	**Coherent Quadrature Modulation Techniques-QPSK and MSK**(Generation, reconstruction, waveform, signal space diagram **(no derivation and numerical)**	02	01
	c	**Noncoherent Binary Modulation Techniques-** Noncoherent orthogonal modulation, Noncoherent BFSK, DPSK (reconstruction), comparison FSK, PSK, QPSK, MSK	02	01
	d	**M-ary Modulation Techniques-** M-ary PSK, QAM and FSK(Generation, reconstruction, waveform, signal space diagram),Bit Vs symbol Error Probability and Synchronization-carrier and symbol Synchronization	02	01

Unit – IV

Teacher should facilitate learning of Information and Detection Theory.

4.	**Information and Detection Theory(numerical)**		**Lecture required**	**Reference No**
	a	Uncertainty, Information and Entropy, properties of Entropy, Extension of a discrete Memory less source, source coding theorem.	02	01
	b	Huffman coding, Discrete Memory less channels, Mutual information and it's properties, channel capacity	03	01
	c	Channel coding theorem, Differential Entropy and Mutual Information, Channel Capacity Theorem	03	01

Unit - V

Teacher should facilitate learning of represent of Channel Coding

5.	Channel Coding		Lecture required	Reference No
	a	Coding introduction, Error probability with repetition in the binary symmetric channel.	04	02
	b	**Linear Block Codes** Hamming distance, Block codes- coding and decoding, decoding the received codeword	01	02
	c	**Algebraic codes** Single parity check bit code, Repeated codes, Hamming code, Extended code, Cyclic codes, **(The Golay code, BCH codes- no numerical)**	02	02
	d	**Automatic repeat request** Performance of ARQ systems	01	02

Reference Books:

1. S. Haykin, "Digital Communications", Wiley Student Edition, ISBN 9971-51-205-X.
2. Carlson, P. Crilly and J. Rutledge, "Communication Systems- An Introduction to Signals and Noise in Electrical Communication", McGraw Hill International Edition, 4th Edition, ISBN 0-07-121028-8.
3. H. Taub, D. Schilling, "Principles of Communication Systems", Tata McGraw Hill, 2nd Edition, 2005, ISBN 0-07-462456-3.

Microcontrollers & Peripheral Interface Controller (PIC)

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

1.	The 8051 Microcontroller		Lecture required	Reference No
	a	Comparison of Microprocessor and Microcontroller, Definition of Embedded system, Criterion for choosing a microcontroller, Overview of the microcontroller Family, Block diagram description of 8051	1	1,2
	b	**Memory and Register organization :** Register in 8051,PSW,ROM memory map, RAM memory space allocation, Register Banks, Understanding the working of registers with MOV and ADD Instructions	2	1,2
	c	Stack, PUSH &POP Instructions, Looping, Conditional and Unconditional Jumps, Subroutines, Time delay calculations, CALL and RET Instruction.	2	1,2
	d	8051 pin diagram, Understanding the function of each pin, port structure, Dual roles and i/o port programming	2	1,2
	e	I/O Bit Manipulation programming, Programming for creating square wave, Monitoring of Individual port pin, Checking an input bit etc.	1	1,2

Unit - II

2.	8051 Programming		Lecture required	Reference No
	a	Addressing Modes in 8051 and Programming using these modes, MOVC and MOVX Instructions	2	1,2
	b	Arithmetic Instructions: Instructions related to Addition, Subtraction, and Multiplication, Division, Increment and decrement. Programming associated with these instructions	3	1,2
	c	Logic and Compare Instructions AND, OR, XOR, NOT, COMPARE, ROTATE, SWAP and Programming including number conversion	3	1,2

Unit – III

3.	Timer, Serial port and Interrupt programming		Lecture required	Reference No
	a	Basic registers of timers, structure of TMOD register, Mode 1 programming, , Generation of large delay, Mode 2 programming	2	1,2
	b	Counter programming,, TCON register structure,	2	1,2
	c	Serial communication basics, RS 232, 8051 Serial Port Programming, SCON, RI and TI. Programming for receiving and transmitting data serially. Doubling the baud rate.	2	1,2
	d	8051 interrupts: Interrupt vs. polling, Interrupt service routine, steps in executing an interrupt, Six interrupts in the 8051, Interrupt priority in 8051, enabling and disabling the interrupt, Steps in enabling the interrupt. Programming timer interrupts, External hardware interrupt, Serial communication interrupts.	2	1,2

Unit – IV

4.	Interfacing		Lecture required	Reference No
	a	Switch interfacing, LED interfacing, LCD interfacing,	1	1,2
	b	ADC interfacing,	1	1,2
	c	DAC interfacing,	1	1,2
	d	Sensors interfacing,	1	1,2
	e	Motor control : Stepper motor, Relay,	2	1,2
	f	DS12887 RTC Interfacing	1	1,2
	g	Serial communication protocols I2C, SPI, MODBUS	1	4

Unit – V

5.	Peripheral Interface Controller (PIC) microcontrollers		Lecture required	Reference No
	a	PIC microcontrollers: PIC microcontrollers overview and features, PIC 16C6X/7X, PIC 16C6X/7X ALU, CPU registers, status register, FSR	2	3
	b	Pin Diagram, PIC reset actions, PIC oscillator connections.	1	3
	c	PIC memory organization	1	3
	d	PIC 16C6X/7X instructions, Addressing modes, I/O ports, interrupt in PIC 16C61/71, PIC 16C61/71 timers	2	3
	e	PIC 16C61/71 ADC	1	3
	f	Introduction to PIC 16F8XX Flash microcontrollers	2	3

Reference Books:

1. M.A. Mazidi, J.C. Mazidi, R.D. McKinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, Second Edition, Pearson
2. Kenneth Ayala, The 8051 Microcontroller, Third Edition, Delmar Learning, a part of Cengage Learning (India Edition)
3. Ajay Deshmukh, Microcontrollers[Theory and Applications], Tata McGraw hill, New Delhi
4. Mike Predko - Programming and Customizing 8051 micro controller, TMH
5. N Senthil Kumar, M Saravanan, S Jeevananthan, and Satish Shah- Microprocessors and Interfacing (Series - Oxford Higher Education)

Feedback Control System

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of control system and finding transfer function of system.

1.	**Introduction to control system**		**Lecture required**	**Reference No**
	a	History and development of Automatic control system.	01	01
	b	Types of control system & open loop and closed loop system.	01	05
	c	Transfer function of Block diagram algebra	02	05
	d	Masons gain formula and transfer function of signal flow graph.	02	01
	e	Conversion of Block diagram algebra to Signal flow graph.	01	05
	f	Conversion of electrical system to Signal flow graph.	01	01

Unit - II

Teacher should facilitate learning of determining the stability of any system and different types of standard test signals that are used in control system.

2.	**Time response and stability of control system**		**Lecture required**	**Reference No**
	a	Standard test signals	01	02
	b	Time response of first and second order system.	01	05
	c	Steady state error and error constant.	01	05
	d	Design specifications of second order system.	01	05
	e	Transient response & its specifications.	01	05

	f	The concept of stability & Necessary condition of stability	01	05
	g	Hurwitz stability criterion.	01	05
	h	Routh stability criterion, Relative stability analysis.	01	05

Unit – III

Teacher should facilitate learning of root locus and its construction and design of lead and lag compensator.

3.	**Introduction to Root locus**		**Lecture required**	**Reference No**
	a	General rule to draw root locus.	02	05
	b	Construction of root locus.	02	05
	c	Root counter.		
	d	Effect of addition of open loop poles.	01	05
	e	Effect of addition of open loops zeros.	01	05
	f	Design of lead and lag compensator using root locus.	02	05

Unit – IV

Teacher should facilitate learning of bode plot, polar plot and Nyquist plot.

4.	**Frequency domain analysis**		**Lecture required**	**Reference No**
	a	Correlation between Time and frequency response.	01	01
	b	Basics of Magnitude and phase plot.	01	05
	c	Construction of bode plot.	03	05
	d	Concept of lead and lag compensator using bode plot.		
	e	Polar plot.	01	05

	F	Nyquist stability criterion.	02	05
	g	Assessment of Relative stability using Nyquist criterion.		01

Unit - V

Teacher should facilitate learning of

5.	**State space analysis and controllers.**		**Lecture required**	**Reference No**
	a	Concept of state (State variable and state model).	01	05
	b	State model of linear system	01	05
	c	Solution of state equation.	02	05
	d	Controllability and observability	01	05
	e	Introduction to controller PI, PD and PID.	01	05
	f	Stepper motor, servomotor and synchro.	02	05

Reference Books:

1. I.J. Nagrath and M. Gopal – Control system Engineering- New age 4th edition.
   I.J. Nagrath and M. Gopal – Control system Engineering- New age 5h edition
2. Katsuhiko Ogata- Modern Control engineering- Pearson 4th edition.
3. Ashok kumar- Control system- Tata McGraw Hill Publishing company.
4. R. Ananda and P. Ramesh Babu- Control system Engineering- SciTech.
5. Smarajit Ghosh – Control systems second edition – PEARSON publishers.

Electromagnetic Engineering

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit – I

Teacher should facilitate learning of Coulomb's law and electric field intensity.

1	Introduction to Coulomb's law and electric field intensity		Lecture required	Reference No
	a	Review of vector Analysis and coordinate systems.	1	1
	b	Coulomb's force law & **Numerical** based on force law.	1	1
	c	Concept of electric field intensity and **Numerical** based on Electric field due to point charge.	1	1
	d	Volume charge density, surface charge density, Line charge density **(Derivation and Numerical)**	1	1
	e	Electric field due to line charge, surface charge and Volume charge density, Numerical based on different configuration of charges. **(Derivation and Numerical)**	3	1
	f	Concept of Electric Flux. Relation between flux density & electric field intensity(**Numerical**)	1	1

Unit – II

Teacher should facilitate learning Gauss's law, Energy and Potential.

2	Gauss's law, Energy and Potential		Lecture required	Reference No
	a	Gauss's law, Application of Gauss's law to symmetrical charge distribution. **(Derivation and Numerical)**	1	1
	b	Divergence Theorem. **(Derivation and Numerical)**	1	1
	c	Maxwell's first equation in electrostatics	1	1
	d	Work Done, Concept of Potential & Potential Difference. **(Derivation and Numerical)**	1	1
	e	Potential difference in field of point, Line, Surface, Volume charge. **(Numerical)**	1	1
	f	Potential gradient, Relation between Potential gradient & Electric filed intensity. **(Derivation and Numerical)**	1	1
	g	Dipole and its electric field, Dipole movement. **(Derivation)**	1	1
	h	Energy density in electrostatic field. **(Derivation)**	1	1

Unit - III

Teacher should facilitate learning Conductor, Dielectrics and Capacitance.

3	Conductor, Dielectrics and Capacitance		Lecture required	Reference No
	a	Current and current density. Current continuity equation. **(Derivation and Numerical)**	1	1
	b	Properties of conductors & Boundary conditions.	1	1
	c	The nature of Dielectric materials.	1	1
	d	Boundary Condition for perfect Dielectric materials, conductor & free space materials. **(Derivation and Numerical)**	3	1
	e	Capacitance, Energy Density in parallel plate capacitor, Parallel plate capacitor. **(Numerical)**	1	1
	f	Calculation of capacitance of various configurations. Coaxial/cylindrical, spherical & isolated Spherical **(Numerical)**	1	1
	g	Poisson's and Laplace's equations. **(Derivation & Numerical)**	1	1

Unit – IV

Teacher should facilitate learning Magneto statics

4	Magneto statics		Lecture required	Reference No
	a	Biot-Savarts law and its vector form. **(Derivation & Numerical)**	1	1
	b	Magnetic field due to finite, infinitely and circular loop long current carrying conductor. **(Derivation)**	2	1
	c	Ampere's Circuital law, Point form of Ampere's circuital Law/Curl operator. **(Derivation & Numerical)**	1	1
	d	Stokes theorem. **(Derivation & Numerical)**	1	1
	e	Magnetic flux & Magnetic flux density.	1	1
	f	Scalar and Vector magnetic potential. **(Numerical)**	1	1
	g	Lorentz's Force equation. Energy stored in magnetic field. **(Derivation & Numerical)**	1	1

Unit - V

Teacher should facilitate learning Time Varying Fields & UPW.

5	Time Varying Fields & UPW		Lecture required	Reference No
	a	Maxwell's equations. (Differential, Integral and Phasor forms) for time varying, Static field & free space. **(Derivations)**	2	1
	b	Uniform plane waves, Transformation of UPW from time varying form into Phasor, Vice versa. **(Numerical)**	1	1
	c	Representation of wave motion in free space. (Wave equations).	1	1
	d	Representation of wave motion in perfect dielectrics and Lossy dielectrics.	1	1
	e	Poynting's theorem & Wave power. **(Derivation)**	1	1
	f	Propagation in good conductor and Skin effect. **(Numerical)**	1	1
	g	Introduction to antenna basic parameter-Patterns, Beam area, radiation intensity, Beam efficiency, directivity & gain, antenna aperture, Effective height.	2,3	2,3

Reference Books:

1. Engineering Electromagnetic-William H. Hayt, J A Buck, Tata McGraw Hill Publication. 7thEdition.
2. K. D. Prasad - Antenna and Wave Propagation, Satya Prakashan.
3. Electromagnetics- Schaum's outline series, 2nd edition, Joseph A Edminister, Tata McGraw Hill edition.
4. R K Shevgaonkar, "Electromagnetic Waves", 1st Edition, Tata McGraw Hill.

Electronic Circuit Design Lab

Teacher, Paper setter and Examiner should follow the guidelines as given below.

SN	Experiment Title	Lab hours required
1	**Design and test discrete series voltage regulator (with error amplifier) with unregulated power supply.** a) Design and test of series voltage regulator (using error amplifier). b) Using step down transformer, full wave bridge rectifier (using diodes) and capacitor filter, design and test unregulated power supply required for series voltage regulator. [Design of series voltage regulator is without protection circuit and max output current 500mA- do not use Darlington pair]	06
2	**Design and test Inverting /Noninverting amplifier.** a) Design and test single stage BJT CE / CC amplifier for given Av, S, Ri, Ro, F_L, Vcc, Q points, R_{LW}, Source resistance. b) Perform DC and AC analysis find theoretical values and compare it with designed circuit values. [Design of single stage (use self-biasing) without feedback CE / CC BJT amplifier]	04
3	**Design and test of single tuned amplifier using BJT for given center frequency.** a) Design of biasing circuit (self bias). b) Designing of tuned circuit. c) Calculation and verification of f_0 and bandwidth.	04
4	**Design of Astable Multivibrator using BJT** a) Selection of transistor and external components. b) Calculation and verification of desired output frequency and amplitude of output signal.	04
	OR	
4	**Design and test Schmitt trigger using BJT.** **a)** Selection of transistor and external components for given Upper trigger point (UTP) and Lower trigger point. (LTP) b) Calculation and verification of desired Upper trigger point (UTP) and Lower trigger point. (LTP).	04

SN	Experiment Title	Lab hours required
5	**Design and fabricate any one circuit from Syllabus** a) Select the circuit from syllabus (only from Electronic Circuit Design and other than laboratory experiments). b) Design the circuit. c) Implement and test the designed circuit on Printed Circuit Board. [Maximum group size to conduct this experiment is Four. Implementation must be on PCB. Students have to write report (design, fabrication method and testing results) in their regular Laboratory manual]	10

Note: Lab file should consist of minimum five experiments.

All experiments (except Expt No 5), must performed using breadboard only.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e

2) Goyal , Khetan - Monograph on Electronics Design Principles, Khanna Pub.

3) M.M. Shah - Design of Electronics Circuits and Computer Aided Design, New Age Int.

4) Bell – Solid State Pulse Circuits, PHI 4/e

5) IC datasheets.

Feedback Control System Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	To Plot the magnitude & phase plot of lead electrical network	02
	2	To Plot the magnitude & phase plot of lag electrical network	02
	3	To determine the transient response of RLC electrical network	02
	4	Study of flow control using PID controller	02
	5	Study of synchronous to observe angular displacement	02
	6	Study of stepper motor	02
		Group-B (MATLAB based)	**Lab hours required**
	1	Obtain the unit step response of a second order system a) Zeta= 0.5 and ω_n= 6 rad/sec. b) $(S^2+9s+19)/ (s^3+7S^2+14S+8)$	02
	2	Sketch the polar plot of (Unity f/b/ system) a) G(s) = 20s/(s+10(s+10) b) G(s) = 10/s(s+1)(s+2)	02
	3	Sketch the Bode plot for the transfer function (Unity f/b/ system) a) G(s) = 1000/s(1+0.1s)(1+0.01s) b) G(s)= 10/s(s+1)(s+2)	02
	4	Sketch the Nyquist plot for the system a) G(s) H(s) = 60/(s+1)(s+2)(s+5) b) $G(s)H(s) = 1/(s^2+0.8s+1)$	02
	5	The open loop transfer function of a servo system with unity feedback is given by G(s) = 10/(s+2) (s+5). Determine the damping ratio, undamped natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input?	02
	6	a) A system has G(s) = 0.035/s(1+0.5s)(1+0.04s) Design a suitable lag compensator to give velocity error constant 27.3 s^{-1} and phase margin =45°	02

		b) The open loop transfer function of a unity feedback system G(s) = K/s(s+1)(s+2) Design suitable lag-lead compensator to achieve the following: Static velocity error constant = 10 s^{-1}. Phase margin = 50° and Gain margin less than or equal to 10dB.	

Note: Lab file should consist of minimum FOUR experiments from each group.

In group B Examples of matlab is given for reference .we can perform

Matlab program for such experiment by another example also

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Guide lines for ICA:-

ICA shall be based on continuous evaluation of students. The semester and practical assignment submitted by the student in the form of journal

Reference Books:

1. S. Hasan Saeed – Automatic control systems (with MATLAB programs) – Katson Education Series. S.K.Kataria and sons New Delhi
2. Smarajit Ghosh – Control systems second edition – PEARSON publishers.
3. I.J. Nagrath and M. Gopal – Control system Engineering- New age 4th edition.
4. Katsuhiko Ogata- Modern Control engineering- Pearson 4th edition.
5. Ashok kumar- Control system- Tata McGraw Hill Publishing Company.

Communication System-II Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	To generate and detect PCM signal.	02
	2	To understand waveform of Delta Modulation and Demodulation.	02
	3	To understand waveform of Adaptive Delta Modulation and Demodulation.	02
	4	To generation and detection of FSK i/p and o/p waveform.	02
	5	To generation and detection of PSK i/p and o/p waveform.	02
	6	To generation and detection of ASK i/p and o/p waveform.	02
		Group-B	**Lab hours required**
	7	To generation and detection of QPSK/QAM i/p and o/p waveform.	02
	8	To Study different line codes (NRZ, RZ, polar RZ, bipolar(AMI),Manchester)	02
	9	Noise analysis using any software tool (use of any discrete distribution).Find response by changing parameters.(use any open source software)	02
	10	Noise analysis using any software tool (use of any continuous distribution).Find response by changing parameters.(use any open source software)	02
	11	Execute Shannon fanon algorithm by using any software tool.(use any open source software)	02
	12	Execute Huffman coding by using any software tool.(use any open source software)	02

Note: Minimum FOUR Experiments from each group.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. S. Haykin, “Digital Communications”, Wiley Student Edition, ISBN 9971-51-205-X.
2. A. Carlson, P. Crilly and J. Rutledge, “Communication Systems- An Introduction to Signals and Noise in Electrical Communication”, McGraw Hill International Edition, 4th Edition, ISBN 0-07-121028-8.
3. H. Taub, D. Schilling, “Principles of Communication Systems”, Tata McGraw Hill, 2nd Edition, 2005, ISBN 0-07-462456-3.

Microcontrollers & Peripheral Interface Controller Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	Study of 8051 / 8085 assembler and Simulator by writing program for addition and subtraction.	02
	2	Write and Execute program for multiplication and division	02
	3	Write and Execute program for Calculation of factorial.	02
	4	Write and Execute program to flash LED.	02
	5	Write and Execute program to interface a switch.	02
	6	Write and Execute program to display 0 to 9 continuously on 7-Segment display.	02
	7	Write and Execute program to demonstrate interfacing of multiplexed 7-Segment display.	02
	8	Write and Execute program to demonstrate interfacing of DAC.	02
		Group-B	**Lab hours required**
	9	Write and Execute program to demonstrate interfacing of ADC.	02
	10	Write and Execute program to demonstrate interfacing of Stepper Motor.	02
	11	Two experiment based On PIC 16C6X/7X	04
	12	Two experiments to understand the working of serial protocols	04

Note: Lab file should consist of minimum six experiments from group A and two experiments from group B.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. M.A. Mazidi, J.C. Mazidi, R.D. McKinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, Second Edition, Pearson
2. Kenneth Ayala, The 8051 Microcontroller, Third Edition, Delmar Learning, a part of Cengage Learning (India Edition)
3. Ajay Deshmukh, Microcontrollers[Theory and Applications], Tata McGraw hill, New Delhi
4. Mike Predko - Programming and Customizing 8051 micro controller, TMH
5. N Senthil Kumar, M Saravanan, S Jeevananthan, and Satish Shah- Microprocessors and Interfacing (Series - Oxford Higher Education)

Computer Programming-III Lab

Teacher and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Basic MATLAB/Scilab Commands and introduction to MATLAB/Scilab Software.

1.	Introduction to MATLAB/Scilab		Lecture required	Reference No
	a	**Getting Starting with MATLAB/Scilab.** Command Window, Editor Window, Figure Window, Help Window, Command History Window, Current Directory Window, Workspace Window.	1	1
	b	**Data Types in MATLAB/Scilab.** Data Types, Variables, Keywords, Assignment Statement, MATLAB/Scilab System Variables, Semicolon, Percentage Sign.	1	2
	c	**MATLAB/Scilab Commands.** Commonly Used System MATLAB/Scilab Commands		

Unit - II

Teacher should facilitate learning of Handling of Arrays and Matrices.

2.	Handling of Arrays and Matrices		Lecture required	Reference No
	a	Creating an Array, Accessing Elements of an Array, Regular Arrays, Expanding and Reducing an Array, the Length and Size functions.	1	1,2
	b	Array Sorting, Mathematical Operations on Arrays (Addition, Subtraction, Multiplication by Scalar, and Multiplication of two arrays).	1	2
	c	Division of Two Polynomials, Relational and Logical		

		operators on Arrays.		
	d	Creating a Matrix, Accessing Element of a Matrix, Length and Size of a Matrix.	1	2
	e	Expanding and Reducing the size of a Matrix, Shifting and sorting Matrices.		
	f	Creating Special Matrices (Identity Matrix, Anti-Identity Matrix, 0's Matrix, 1's Matrix, and Magic Square), Transpose, Determinant and Inverse of a Matrix.	1	2
	g	Mathematical Operations on Matrices.		

Unit – III

Teacher should facilitate learning of Programming in MATLAB/Scilab, M-FILE Scripts.

3.	**Programming in MATLAB/Scilab, M-FILE Scripts**		**Lecture required**	**Reference No**
	a	String Operations, String MATLAB/Scilab Functions, Time and Date Functions.	1	1,2
	b	Introduction to M-file scripts, Creating, Saving and Running an M-file.	1	2
	c	Variables of a Script File, disp function, fprintf function, Reading Input from keyboard, sscanf function.		
	d	The Conditional Control Statements, Nested Conditional Control Statements.	1	2
	e	The Loop Control Statements, for loop, while loop.	1	2
	f	Break, continue and return statement.		

Unit – IV

Teacher should facilitate learning of MATLAB/Scilab Functions and Two-Dimensional Plots.

4.	MATLAB/Scilab Functions and Two-Dimensional Plots		Lecture required	Reference No
	a	Creating MATLAB/Scilab function file, local and global variable, saving and using function file, Inline functions, Comparison between script files and function files.	1	1,2
	b	The plot Command, fplot command, Plotting Multiple Graphs in the same plot.	1	1,2
	c	Formatting a plot, plot with Logarithmic axis, histograms, and polar plots.	1	1,2
	d	Plotting Multiple plots on the same page, Examples of MATLAB/Scilab Applications on plots.		

Unit - V

Teacher should facilitate learning of Graphical User Interface and Applications of MATLAB/Scilab.

5.	Graphical User Interface and Applications of MATLAB/Scilab		Lecture required	Reference No
	a	Introduction to GUI, GUI Development Environment, Creating a Simple GUI.	1	2
	b	GUI Components: textbox, pushbuttons, toggle button, checkbox, radio button, popup Menus, List box and Slider.		
	c	Dialog Boxes: Error and warning Dialog Boxes, Input Dialog Box, Question Dialog Box, List Dialog Box, and File Dialog Box.	1	2
	d	Application: Linear Algebra, Curve Fitting and Interpolation, Numerical Integration, Digital Image Processing, etc.	1	2

Reference Books:

1. Stephen J. Chapman, "MATLAB Programming for Engineers", Thomsan Learning, 3rd Edition, 2007
2. Y. Kirani Singh and B.B. Chaudhari, "MATLAB Programming", PHI, 1st Edition, 210
3. Amos Gilat, "MATLAB An Introduction with Applications", Wiley India, 1st Edition, 210
4. Rudra Pratap, " Getting Started with MATLAB 7", OXFORD, 1st Indian Edition, 2006

Lab Course Contents

Teacher should facilitate learning following lab experiments using MATLAB/Scilab:

A	Group-A		Lab hours required
	1	**Study of Creation of Arrays.** Create a row vector that has different elements, Create a column vector that has different elements, Create a matrix for given elements.	02
	2	**Study of various operations on matrices** Create two matrices, Perform arithmetic operations like addition, subtraction, multiplication & division on any two matrices, Prove addition of matrices is commutative and associative, Show matrix multiplication is distributive.	02
	3	**To plot sinusoidal, triangular and square signal** Plot all signals in a given range on same figure with suitable naming.	02
	4	**Compute sampling of continuous time signal.** Plot continuous time signal, Plot signals for different conditions of sampling and verify sampling theorem, All signals plot on one figure.	02
	5	**To find the pole zero plot of the given network.** Obtain Transfer function, Calculate poles & zeros of given system, Plot Pole-Zero plot for given function.	02
	6	**To find the polar/Nyquist plot of the given network.** Obtain transfer function, Plot polar/Nyquist plot for given system	02

	7	**Modeling of any one differential equation** Select any one differential equation and implement it with the help of simulation.	02
B		**Group-B**	**Lab hours required**
	1	**Applications of MATLAB/ Scilab to Electronics Engineering subjects (4 Practicals)**	02 x 4

NOTE: minimum 6 practical's from group A and 2 practicals from group B.

Guide lines for ICA:

ICA shall be based on continuous evaluation of student performance throughout semester and practical assignment submitted by the student in the form of journal.

Reference Books:

1. Rudra Pratap, "Getting Started With MATLAB 7: A Quick Introduction For Scientists And Engineers".
2. Amos Gilat , " MATLAB : An introduction with applications, 4th edition.
3. Stephen Chapman - MATLAB programming for Engineer, Thomson.
4. www.scilab.org

NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – VI

W.E.F 214 – 215

Industrial Economics & Telecom Regulation

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Basic concepts in economics.

1.	**Basic Concepts in Economics**		**Lecture required**	**Reference No**
	a	Demand, supply, elasticity of demand and supply.	1	1,5
	b	competition, monopoly, oligopoly, monopolistic competition	1	1,5
	c	Causes creating categories of monopoly organization.	1	1,5
	d	price determination under perfect competition and monopoly, price discrimination	2	1,5
	e	equilibrium of firm under competition and monopoly	1	1,5
	f	Functions of money, supply and demand for money, money price level and inflation, black money, consequences. meaning, magnitude	3	1,5

Unit - II

Teacher should facilitate learning of Banking and Taxation system of Country

2.	**Banking and Taxation system of Country**		**Lecture required**	**Reference No**
	a	Function of commercial banks, multiple credit creation, banking system in India, shortcomings and improvement.	3	1,5
	c	Central banking: Function of central banking illustrated with reference to Reserve Bank of India (RBI), monitory policy meaning, objectives and features.	3	1,5
	d	Sources of public revenue: principles of taxation, direct and indirect taxes, distribution of incidence, tax structure, reform of tax system.	3	1,5

Unit – III

Teacher should facilitate learning of International Trade and management.

3.			**Lecture required**	**Reference No**
	a	**International Trade and economic crises of 2008,** Theory of international trade, balance of trade and payment, theory of protection, tariffs and subsidies, foreign exchange control, devaluation.	3	1,5
	b	**Basic concept of management**-Planning, organization, communication, Leadership & motivation.	3	1,5
	c	**Marketing management** and marketing Mix-Product, Place, price and promotion	3	1,5

Unit – IV

Teacher should facilitate learning of Telecommunications Regulation

4.	**Telecommunications Regulation**		**Lecture required**	**Reference No**
	a	The Task of Regulation, Markets and market failure, The rules of regulation.	2	1,2
	b	The Framework for Regulation, Legal frameworks, Instruments of regulation, Enforcement, Dangers of regulation and operational aspects.	3	
	c	Regulatory Strategy and Price Controls, Market strategies/ structures, Engineering and technology.	3	1,2
	d	Regulation and the Future(John Buckley, Telecommunications Regulation)	1	1,2

Unit - V

Teacher should facilitate learning of National Telecom Policy.

5.	National Telecom Policy		Lecture required	Reference No
	a	National Telecom Policy 1994,New Telecom Policy 1999, Guidelines For Up linking From India	3	1,2
	b	Broadband Policy 2004, Guidelines For Obtaining License For Providing Direct-To-Home (DTH) Broadcasting Service In India.	3	
	c	TRAI Act 1997, Cable Network Act, TRAI Regulation. ITU's role in global communications. (http://www.trai.gov.in/Default.asp http://www.itu.int/net/home/index.aspx http://www.itu.int/net/about/index.aspx Black, Telecommunications Law In The Internet Age, 2002, Elsevier)	3	

Reference Books:

1. R Jayaram, Namita R Kotwani, "Industrial Economics and Telecommunication Regulations", PHI
2. John Buckley, Telecommunications Regulation, and Institution of Electrical Engineers © 2003, Published by: The Institution of Electrical Engineers, London, United Kingdom. (ISBN:0852964447)
3. John R McNamara, "The economics of innovation in the telecommunications industry", Quorum Books, Newyork.
4. Hank Intven, McCarthy Tetrault, "Telecommunication Handbook"
5. Indian Economy: A.N Agrawal

Power Electronics

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Power Semiconductor devices, Basic principles and their characteristics.

1.		Introduction to Power Devices	Lecture required	Reference No
	a	**Silicon Controlled Rectifier (SCR):** Structure, symbolic representation, working principle, two transistor Analogy of SCR (Derivation of Anode current expected)	1	2
	b	**Characteristics (Static and Dynamic**)-(Numerical expected on latching current and pulse width calculation) **Static Characteristics:** Circuit diagram, Characteristics curve **Dynamic Characteristics:** Turn-ON and Turn-OFF mechanism and characteristics curve	2	2
	c	**Protection circuits of SCR: (Numerical expected)** di/dt and dv/dt protection and Snubber circuit design	2	2
	d	**IGBT, GTO** : Structure, symbolic representation, Working principle, characteristics.	2	2
	e	**DIAC, TRIAC:** Structure, symbolic representation, Working principle, characteristics.	2	2

Unit – II

Teacher should facilitate learning of Basics of Rectifiers with different loads and their operation with waveforms.

2.		Line Frequency controlled Converters/Rectifier	Lecture required	Reference No
	a	**Single phase Half Controlled Bridge Rectifier with R and RL load:(Numerical expected)** Circuit diagram, waveforms, operation, average load voltage, RMS load voltage.	2	2

	b	**Single phase Full Controlled Bridge Rectifier with R and RL Load:(Numerical expected)** Circuit diagram, waveforms, operation, average load voltage, RMS load voltage.	1	2
	c	Calculation of various performance parameters like Average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor etc. for **Single phase** Half and Full Controlled Bridge Rectifier (**Numerical expected**)	1	2
	d	**Three phase Half controlled converter (R & RL load)** :**(No numerical expected)** Circuit diagram, waveforms, average load voltage, RMS load voltage, Average load current, Operating Modes (continuous and discontinuous conduction modes).	2	2
	e	**Three phase full controlled converter(R & RL load) :No numerical expected)** Circuit diagram, waveforms, average load voltage, RMS load voltage, Average load current, Operating Modes (continuous and discontinuous conduction modes).	1	2
	f	**Effect of Source Inductance: :(Numerical expected)** 1-Phase and 3-Phase Fully controlled Rectifier with derivation of average output voltage and waveforms and explanation.	2	2

Unit – III

Teacher should facilitate learning of DC-DC converters with their different modes of operation.

3.	**DC – DC Converter**		**Lecture required**	**Reference No**
	a	**Classification of Choppers** **Control strategies of dc-dc converter**:(Time Ratio Control and current Limit control)	1	2
	b	S**tep down dc-dc converter:(Numerical expected)** Circuit diagram, waveform, output voltage calculations. Continuous conduction mode, Boundary between continuous and discontinuous conduction Mode and Discontinuous Conduction Mode.	2	1
	c	S**tep up dc-dc converter:(Numerical expected)** Circuit diagram, waveform, output voltage calculations. Continuous conduction mode, Boundary between continuous and discontinuous conduction Mode and Discontinuous Conduction Mode.	2	1

	d	**Full Bridge dc-dc converter**: **(Numerical Expected)** PWM with Bipolar voltage switching. Derivation of output voltage.	1	1
	e	**Switched mode power supply: Only** Block diagram and explanation.	1	1

Unit – IV

Teacher should facilitate learning of Inverters and their basic operating principles.

4.	**Inverters**		**Lecture required**	**Reference No**
	a	**Inverters:** Basic Series and Parallel inverters, construction, principle of operation and waveforms.	1	2
	b	**Square and PWM Bridge Inverters:(Numerical expected)** Single phase Half bridge inverters with R and R-L load, RMS output voltage calculations. (expression for Average, rms and peak thyristor current)	2	2
	c	**Square and PWM Bridge Inverters:(Numerical expected)** 1–Phase Full bridge inverters with R and R-L load, RMS output voltage calculations. (expression for Average, rms and peak thyristor current) Square wave, quasi-square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio.	2	2
	d	**Harmonic reduction Techniques**. By single pulse-width modulation By transformer connection By multiple commutation in each half cycle By stepped wave inverter	1	2
	f	**3-Phase Bridge inverter**: With balanced star resistive load, 120 degree and 180 degree conduction mode waveforms for line and phase voltages.	2	2

Unit - V

Teacher should facilitate learning of AC controllers and Uninterruptible Power Supply.

5.	AC Controllers, UPS and Simulation of converters		Lecture required	Reference No
	a	**AC controllers**: Principle of On-Off control or integral cycle and phase angle control**.**	1	2
	b	Single phase Half wave AC control with R and R -L load, derivation of output Voltage. (Numerical expected)	2	2
	c	Single phase full wave AC control with R and R -L load, derivation of output Voltage. (Numerical expected)	2	2
	d	Uninterruptible power supply: - Basic principle, Different configurations/ types of UPS – Off-line On-line, Line Interactive, their comparison. , Battery- Ah, back up time and battery charger rating calculations.	2	2,4
	e	Simulation of single phase full converter, single phase semi converter, FFT analysis. Simulation model for the measurement of power factor angle. Simulation of single phase full bridge inverter, PWM inverter. Simulation of single phase AC voltage controller.	2	4

Reference Books:

1. Ned Mohan, T.M. Undeland and W.P. Robbins- Power Electronics, converters , Application, and Design , John willey and sons , (3rd Edition)
2. M.D. Singh , K.B. Khanchandani - Power Electronics, TMH (3rd Edition)
3. M.H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e . Or Pearson.
4. Dr.Shailendra Jain, Modeling and simulation using MATLAB-simulink,Wiley India pvt.Ltd.
5. M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
6. P.C.Sen Power Electronics Tata Mc-Graw-Hill Publishing Company Limited.
7. M.S. Jamil Asgar, - Power Electronics , PHI, 2004, New Delhi.
8. S.K. Bhattacharya - Industrial Electronics and control , Tata Mc-graw-Hill (TMH)
9. Deodatta Shingare , Industrial and Power Electronics, Electrotech Pub.

Electronic Measurement

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Basics of Analog instruments.

1.	Analog Instruments		Lecture required	Reference No
	a	**Q meter :-** Basic Q meter circuit, Measurement methods Direct Connection, series connection and parallel connection with circuit diagram (Derivation not Required) Sources of errors with its derivation. **(Numerical on sources of errors)**	2	2,1
	b	**True RMS** :-responding voltmeter **Vector voltmeter:** - Block diagram and its explanation.	2	2
	c	**Vector impedance meter: -** Block diagram and its explanation.	1	2
	d	**Bolometer:-**Measurement of power by means of bolometer bridge.	1	1
	e	**Field strength meter: -** Block diagram and its explanation. **Automatic bridges: -** Circuit diagram and its explanation.	2	1

Unit – II

Teacher should facilitate learning of digital instruments.

2.	Digital Instruments		Lecture required	Reference No
	a	**Digital Frequency Meter**: - Basic circuit of a Digital frequency meter, basic circuit for frequency measurement, High frequency measurement.	2	1
	b	**Digital measurement of time**: - Time base selector, measurement of time (period measurement), Ratio and multiple ratio measurement.	2	1
	c	**Universal Counter**, **Electronic Counter:-**Totalizing, Frequency mode, ratio mode, Period mode, Time interval mode.	1	1

	d	**Digital tachometer, Digital Ph meter**	1	1
	e	**Phase meter, Capacitance meter.**	1	1
	f	**Automation in digital instruments: -** Auto zeroing, auto polarity and auto ranging.	1	1

Unit – III

Teacher should facilitate learning of all types of signal generators and analyzers.

3.	**Signal Generators and Analyzers**		**Lecture required**	**Reference No**
	a	Frequency synthesized signal generator.	1	2
	b	Random noise generator, Sweep generator, TV Sweep generator, marker generator, Wobbluscope.	2	1
	c	Vectroscope	1	1
		Optical Time Domain Reflectometer (OTDR).		2
	d	Frequency selective wave analyzer, heterodyne wave Analyzer.	1	1,2
	e	Harmonic distortion analyzers – Harmonic Distortion, Tuned circuit Harmonic analyzer, Heterodyne Harmonic Analyzer, Fundamental suppression Harmonic distortion analyzer.	2	2
	f	Spectrum analyzer- Basic spectrum analyzer using Swept receiver design.	2	1
		Applications of spectrum analyzer		2

Unit – IV

Teacher should facilitate learning of Inverters and their basic operating principles.

4.	Oscilloscope		Lecture required	Reference No
	a	**Block diagram of CRO:-** vertical amplifiers, horizontal deflecting systems, triggered sweep CRO, trigger pulse Circuit.	2	1
	b	**Delay line**: – lumped parameter delay line, distributed parameter delay line.	1	2
	c	Dual beam CRO, dual trace CRO	1	1
	d	Sampling (VHF) oscilloscope, storage oscilloscope (for VLF signal), and digital read out oscilloscope.	2	1
	e	Probes for CRO- direct probe, passive voltage probe and active probe using FET.	2	1
	f	Digital storage oscilloscope.	1	1,2

Unit - V

Teacher should facilitate learning of basics of Data Acquisition, Conversion and Transmission.

5.	Data Acquisition, Conversion and Transmission.		Lecture required	Reference No
	a	Generalized Data Acquisition System, Objectives of DAS, Single channel and multichannel DAS:- (Analog multiplexed, multiplexing outputs of sample/hold, multiplexing after ADC and multiplexing low level data)	2	1
	b	Data loggers.	1	1
	c	Digital Transducer :-Optical Encoder, Resistive Digital Encoders, Shaft Encoder	1	1
	d	Data transmission systems, advantages and disadvantages of digital transmission over analog, Time Division Multiplexing(TDM)	2	1
	e	The IEEE 488 bus.	1	1,2
	f	Computer based testing of an Audio amplifier and a radio Receiver.	1	2

Reference Books:

1. H.S. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2. D. Helfric and W. D. Cooper, "Modern Electronic Instrumentation and
3. Measurement Technique", Pearson LPE, 3rd Edition, 2005.
4. A.K. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
5. K.Lal Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 212.

Audio Video Engineering

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

Teacher should facilitate learning of Basics of Audio engineering.

1.	Describe Methods of sound, video recording and reproduction		Lecture required	Reference No
	a	Describe the basic Disc recording	1	1
	b	Describe the basic Magnetic recording	1	1
	c	Describe the basic optical recording-CD and DVD.	2	1
	d	Explain Monophony, stereophony, Hi-Fi (High Fidelity) System.	1	1
	e	Explain and describe the Public Address (PA) system Basics of aquatics - Block diagram, requirement, Characteristics, its planning for various uses.	2	1
	f	Describe the satellite radio reception (world space). Introduction to blue ray disc format.	2	1

Unit - II

Teacher should facilitate learning of Basics of video and audio engineering.

2.	Describe Basic concept of Television		Lecture required	Reference No
	a	Scanning methods.	1	2
	b	Horizontal and vertical synchronization.	2	2
	c	Introducing Camera Tubes-Orthicon Vidicon, Plumbicon, Saticon, Silicon Diode array.	1	2
	d	Identify the Aspect ratio, Kell factor. Horizontal and vertical resolution Video bandwidth,	2	2
	e	Positive and negative modulation, Composite video signal (CVS).	1	2
	f	Television Transmission- Vestigial Side Band (VSB) transmission, TV Channels, TV Standard, TV Channels bands. Basic block diagram of Monochrome TV receiver.	2	2

Unit – III

Teacher should facilitate learning of Basic of colour television system.

3.	**Describe Colour Television receiver**		**Lecture required**	**Reference No**
	a	Explain basic of Colour fundamental, compatibility, Frequency interleaving.	2	3
	b	Colour mixing, colour camera tube. Colour purity.	1	3
	c	Picture tubes-Static and dynamic convergence.	1	3
	d	Picture tubes-statics and dynamic convergence, colour purity	1	3
	e	Encoder and decoder and different signals comparison	1	3
	f	Different system concepts-PAL,SECAM, NTSC system	2	3
	g	Colour TV transmitter and receiver block diagram.	1	3

Unit – IV

Teacher should facilitate learning of advanced techniques in television

4.	**Describe Advanced TV system and techniques**		**Lecture required**	**Reference No**
	a	Introduction to digital compression techniques	2	4
	b	Block diagram of Digital TV-transmitter and receiver.	1	4
	c	**JPEG techniques.** Joint picture expert group **MPEG techniques** Motion picture expert group	1	4
	d	**MPEG techniques** Motion picture expert group	1	4
	e	Introduction to Advanced Display Plasma, LCD, LED, Organic LED.	2	4
	f	Introduction to HDTV (high-definition TV) transmitter and receiver.	2	4

Unit - V

Teacher should facilitate learning of consumer electronics system.

5.	Advanced Broadcasting systems		Lecture required	Reference No
	a	Introduction to digital cable TV conditional access system (CAS).	2	5
	b	DTH system, Video on demand.	2	5
	c	Introduction to 3D DTV system, CCTV, digital terrestrial TV (DTV).	2	5
	d	Introduction to IPTV and mobile TV .	2	5
	e	Block diagram and working of FAX Machine.	1	5

Reference Books:

1. A.M.Dhake-TV and Video Engineering,TMH
2. R. G. Gupta - TV Engineering and Video system , TMH
3. Kelth Jack - Video Demisified , Penram International
4. S. P. Bali - Colour TV Theory and Practice , TMH
5. R.R.Gulati - Monochrome and colour TV , New Age
6. Bernard Grobb, Charles E - Basic TV and Video system , TMH (6^{Th} Ed.)
7. Philips handbooks on audio ,video and consumer electronics application notes
8. Olson-High Quality Sound recording and reproduction

Industrial Management

Teacher, Paper setter and Examiner should follow the guidelines as given below.

Unit - I

1.	Basics of Managements		Lecture required	Reference No
	a	Introduction, definition of management	1	1
	b	Scientific management.	2	1
	c	Function of management	2	1
	d	Principles of managements	1	1
	e	Level of management, managerial skill/roles	2	1
	f	Relation between administration, management and organization	1	1

Unit - II

2.	Organizational Structures		Lecture required	Reference No
	a	Principles of organization. Design of organization	1	1,2
	b	Forms of organization-Line, Lines and staff	1	1,2
	c	Types of ownerships: partnership, proprietorship	2	1,2
	d	Joint stock Company, private limited, Govt. ltd, public limited	3	1
	e	Cooperative organization	1	1
	f	Public sector and joint ventures	1	1

Unit – III

3.	Personal Management		Lecture required	Reference No
	a	Factors affecting man power planning	1	1
	b	Sources of recruitment. Talent acquisition	1	1
	c	Education & training methods of training workers	1	1

	d	Labour welfare, communication in Industries	2	1
	e	Suggestion system, discipline in industries.	3	1
	f	e-business & e-governances	1	1

Unit – IV

4.	**Financial management**		**Lecture required**	**Reference No**
	a	Definition & function of Financial Management	1	1,4
	b	Capital Structure. Fixed & working capital. Role of SEBI (Securities & exchange Board of India).	2	1,4
	c	Sources of Finance. Loans from Banks. Trade credit. Public deposits	3	1,4
	d	Wants, utility, Demand	2	1,4
	e	Supply, Elasticity of demand & Supply	1	1,4

Unit - V

5.	**Quality management & Industrial Acts**		**Lecture required**	**Reference No**
	a	Definition of quality, quality control	1	1
	b	Process control. Total quality concepts	3	1
	c	ISO 9001-2000	1	1
	d	Factories Act, industrial accidents, industrial safety	2	1
	e	Rights patents, trademarks, copy rights.	2	1

Text Books:

1. M.Mahajan: Industrial Engineering & Production Management, Dhanpat Rai & compony.

Reference Books:

2. O.P.Khanna:- Industrial Engineering & Management, Dhanpat Rai & compony.
3. Koontz: Essential Of Management, TMH6/e.
4. M.Y.Khan & P.K.Jain :- Financial Management, TMH.

Power Electronics Lab

Teacher should facilitate learning following lab experiments:

Group			Lab hours required
A	1	Study of R, RC triggering circuits of SCR to plot waveforms for various values of firing angle.	02
	2	Study of UJT triggering circuits of SCR to plot waveforms for various values of firing angle.	02
	3	Study and design of Class A, B, C, D, E and F commutation circuits of SCR.(Any two)	02
B	1	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.	02
	2	Study of 1- ϕ full controlled converter with R and R-L load, plot input and output voltage waveforms, average load voltage v/s firing angle.	02
	3	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.	02
C	1	Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.	02
	2	Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.	02
	3	Study of SMPS.	02
D	1	Study of Series Inverter and find efficiency.	02
	2	Study of Parallel Inverter and find efficiency.	02
	3	Simulation of single phase full converter, development of model, plotting the waveform on figure and FFT analysis (use MATLAB - SimPowerSystem Software).	02
	4	Simulation of single phase full bridge inverter, development of model, obtain frequency spectrum using powergui block (use MATLAB - SimPowerSystem Software).	02
E	1	Study and plot V-I characteristics of Diac/Triac/GTO/IGBT (any one).	02
	2	Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles.	02
	3	Study of UPS.	02

Note: Lab file should consist of minimum TWO experiments from each group.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A to E. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. Ned Mohan, T.M. Undeland and W.P. Robbins- Power Electronics, converters , Application, and Design , John willey and sons , (3rd Edition)
2. M.D. Singh , K.B. Khanchandani - Power Electronics, TMH (3rd Edition)
3. M.H. Rashid - Power Electronics circuits, devices and applications, PHI, 3/e . Or Pearson.
4. Dr.Shailendra Jain, Modeling and simulation using MATLAB-simulink,Wiley India pvt.Ltd.
5. P.C.Sen Power Electronics Tata Mc-Graw-Hill Publishing Company Limited.
6. Dr. P. S. Bimbhra, Power Electronics, Khanna Publication.
7. M Ramamurthy - An Introduction to Thyristor and their application, Second Edition,
8. M.S. Jamil Asgar, - Power Electronics , PHI, 2004, New Delhi.
9. S.K. Bhattacharya - Industrial Electronics and control , Tata Mc-graw-Hill (TMH)
10. Deodatta Shingare , Industrial and Power Electronics, Electrotech Pub.
11. MATLAB-Sim Power System manuals.

Electronic Measurement Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	Measurement of reactive and resistive components with LCR Q meter.	02
	2	Measurement of Vrms signal with true RMS meter / DMM.	02
	3	Measurement of frequency and Time with the help of Frequency counter.	02
	4	Measurement of motor speed using Digital Tacho meter.	02
	5	Measurement of various parameters with DATA logger.	02
	6	Measurement of Phase angle with the help of digital phase meter.	02
		Group-B	**Lab hours required**
	1	Measurement of frequency and phase shift using Lissajous pattern And testing of different components using CRO.	02
	2	Measure and store the frequency and amplitude with the help of DSO.	02
	3	Measurement of distortion and nature of distortion by harmonic distortion analyzer.	02
	4	Computerized analysis of radio receiver and measurement of power with it.	02
	5	Analysis of test signal with the help of spectrum analyzer.	02
	6	Measurement of distance with OTDR meter	02

Note: Lab file should consist of minimum FOUR experiments from each group.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A or Group B. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. H.S. Kalsi, "Electronic Instrumentation", TMH, 2nd Edition, 2007.
2. A. D. Helfric and W. D. Cooper, "Modern Electronic Instrumentation and Measurement Technique", Pearson LPE, 3rd Edition, 2005.
3. A.K. Sawhney, "Electrical and Electronics measurement and Instrumentation", Dhanpat Rai and company, 18th Edition, 2007.
4. K.Lal Kishore, "Electronic Measurement and Instrumentation", Pearson 4th, Edition, 212.

Audio Video Engineering Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	Study of colour TV receiver.	02
	2	Voltage and waveform analysis for colour TV.	2
	3	Alignment and fault finding of colour TV using pattern generator . (2 expts.)	02
	4	Study of HDTV.	02
	5	Study of digital TV.	02
	6	Practical visit to TV transmitter/Studio.	02
		Group-B	**Lab hours required**
	1	Study of DTH and set of box.	02
	2	Study of CD/DVD players.	02
	3	Study of PA system with cordless microphone.	02
	4	Study of audio system. Study of tone controlled circuit (unit) .	02
	5	Study of tape recorder.	02
	6	Web page designing.	02

Note: Lab file should consist of minimum FOUR experiments from each group.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A and Group B. Evaluation will be based on paper work and performance in the practical.

Reference Books:

1. A.M.Dhake-TV and Vidéo Engineering, TMH
2. R.G.Gupta-TV Engineering and vidéo system, TMH
3. Kelth Jack-Video Demisified, Penram International.
4. S.P.Bali-Colour Tv Theory and practice,TMH
5. Bernard Grobb,Charles E-Basic TV and Video system, TMH(6th Edition)
6. R.R.Gulati-Monochrome and colour TV, New age.
7. Philips Handbooks on audio, video and Consumer Electronics application notes.
8. Olson-High Quality Sound recording and reproduction

Application Software Lab

Teacher should facilitate learning following lab experiments:

		Group-A	Lab hours required
	1	**Installation of Oscad on Ubuntu 12.04 /12.10 and windows.** Describe the open source operating system and its advantages over windows operating system. Find the steps to install Oscad on Ubuntu 12.04 / 12.10 **and** windows operating system**.**	02
	2	**Study of Architecture of Oscad.** Describe the meaning of Electronic Design Automation (EDA) tool, what are the advantages and disadvantage of Oscad. Describe use of Oscad in circuit making, simulation and PCB design.	02
	3	**Study of schematic creation, simulation and PCB design.** Describe the steps to use Oscad in schematic creation, simulation and PCB design on Ubuntu or on windows operating system**.**	02
	4	**Simulation of typical circuit using a) R C b) Diode** Describe the term simulation and how to draw circuit on Oscad consists of RC network. Compare simulated result (current and voltage) of RC network with theoretical calculated values. Describe the simple diode circuit. Observe the input and output waveforms.	02
	5	**Simulation of typical circuit using a) Transistor b) MOSFET** Describe operation and construction of simple transistor amplifier circuit and compare simulated result with theoretical calculated values. Describe operation and construction of simple MOSFET based circuit and compares all simulated node voltage and current with theoretical calculated values.	02
		Group-B	**Lab hours required**
	1	**Simulation and PCB design of typical circuit using IC 555.** Identify the timer IC 555 pin configuration and its use. Describe simple timer circuit simulation and advantages of printed circuit Board (PCB). Find out the steps to create PCB layout.	02
	2	**Simulation and PCB design of typical circuit using Op-Amp 741 IC.** Identify the Op-Amp 741 pin configuration and its use. Describe simple (Inv or Non-Inv amplifier) Op-Amp circuit simulation. Find gain of amplifier and verify with theoretical calculated value.	02

		Describe the steps to create PCB layout.	
	3	**Simulation and PCB design of typical circuit using 74xx series IC.** Describe various IC available in 74xx series. Verify the truth table of basic gate or universal gate. Describe the steps to create PCB layout.	02
	4	**Simulation and PCB design of typical circuit using two stage amplifiers.** Describe the operation and construction of simple two stage transistor amplifier circuit and compare simulated result of each transistor with theoretical calculated values. Describe the AC and DC analysis. Describe the steps to create PCB layout.	02
	5	**Simulation and PCB design of simple DC power supply. (DC power supply circuit include transformer- rectifier-filter- regulator.)** Describe the block diagram and circuit diagram of simple DC power supply. Measure the voltage and current at each stage of circuit. Describe the steps to create PCB layout. (**Optional**- Implement DC power supply circuit on single side cupper clad PCB and compare the all node voltage and current with simulated results)	02

Note: Lab file should consist of minimum FOUR experiments from each group.

Guide lines for ESE:-

ESE will be based on practical assignment submitted by the student in the form of journal. In ESE the student may be asked to perform any one practical out of Group A or Group B. Evaluation will be based on paper work and performance in the practical.

Reference book-

1. **Oscad**- An open source EDA tool for circuit design, simulation, analysis and PCB design. by "**Kannan M. Moudgalya , IIT Bombay**", . Shroff Publication and distributors Pvt. Ltd.
2. **http://oscad.in**