NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Syllabus for

Third Year Electronics Engineering

Faculty of Engineering and Technology

TEACHER AND EXAMINER'S MANUAL

SEMESTER – V

W.E.F 2014 – 2015

Microcontroller Systems

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

Unit - I

Teacher should facilitate learning basics of 8051 microcontroller.

1	**Fundamentals of 8051**		Lecture required	Reference No.
	a	Function pin diagram and architecture of 8051 microcontroller.	2	1,2
	b	Architecture of 8051 microcontroller**:** Oscillator and clock , program-counter, Data-pointer, Stack pointer, Program status word.	2	1,2
	c	Memory organization**:** Data memory (Internal Ram(SFRs), External Ram) ,Program memory(Internal Rom, External Rom)	2	1,2
	d	I/O port Pins and their functions, 8051 I/O Port structures.	3	1,2

UNIT- II

Teacher should facilitate learning8051 addressing modes and instruction set

2	**Addressing modes and Instruction set**		Lecture required	Reference No
	a	Addressing modes of 8051 microcontroller, Instruction set of8 051	1	1,2
	b	Data transfer group of instructions.	2	1,2
	c	Arithmetic and logical group of instructions.	2	1,2
	d	Control transfer group of instructions	2	1,2
	e	Bit operated instructions(Boolean group)	1	1,2

Unit – III

Teacher should facilitate learning of timer/counter, interrupt and serial communication.

3	**Timer/Counter, Interrupt and serial Communication**		Lecture required	Reference No
	a	Timer / counter: TMOD AND TCON Register, Modes of operation, Programming timer / counter.	3	1,2
	b	Interrupt structure and Interrupts programming.	2	1,2
	c	Serial communication programming in 8051 (only Standard 8-Bit UART Mode). Serial data transfer and serial data reception programming example.	3	1,2

UNIT- IV

Teacher should facilitate learning of 8051 interfacing with peripherals

4	**Interfacing of 8051 peripherals**		Lecture required	Reference No
	a	Memory interfacing (RAM, ROM, EPROM) - Basic concept in memory interfacing and address decoding. Interfacing to external RAM and ROM, with 8051.	2	1,2
	b	Interfacing of LED, Switch, 7-Segment display, Multiplexed 7-Segment display with programs	3	1,2
	c	Interfacing of Matrix Key-Board with programs	1	1,2
	d	Interfacing of Liquid Crystal Display with programs.	1	1,2
	e	Interfacing of DAC, ADC, Stepper Motor with programs.	2	1,2

UNIT- V

Teacher should facilitate learning of buses and protocols, RTC, and basics of PIC microcontroller

5	**Buses and protocols, Fundamentals of PIC**		Lecture required	Reference No
	a	Buses and Protocols – RS 232, RS 485, I^2C, MODBUS, IEEE 488.	2	1,4
	b	Interfacing to EEPROM 93C46 / 56 / 66, 24C16 / 32 / 64, RTC DS1307.	3	1,2,4
	c	Introduction to PIC microcontroller. Block Diagram of PIC 16C61,Pin diagram of PIC 16C61	3	3

References:

1) Kenneth J. Ayala - 8051 Microcontroller, PHI.

2) Mazidi and Mazidi - The 8051 Microcontroller and Embedded Systems, Pearson.2^{nd}ed

3) Ajay V Deshmukh: Microcontrollers- Theory and applications TMH.

4)Rajkamal-Embedded Systems-Architecture, programming and design,2^{nd}Edition,TMH

Network System & Filter Design

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

Unit – I

Teacher should facilitate learning of different network topology and state variable analysis.

1	**Network topology and state variable analysis.**		Lecture required	Reference No.
	a	**Network topology**: Directed graph, trees, co-tree and loops, incidence matrix, Tie-set matrix and fundamental tie-set matrix, Cut-set and fundamental Cut- set matrix.	3	1
	b	Network equilibrium equation, Duality and general network transformations.	2	1
	c	**State Variable Analysis** : State space models, State variables-inputs and outputs, Continuous time models, Classification of circuits in State variable analysis, solutions of state equations, Formation of state equation using network graph theory, Zero state response of state vector, complete response of the state vector.	3	1

Unit – II

Teacher should facilitate learning of different Signals and Systems

2	**Introduction to Signals and Systems**.		Lecture required	Reference No.
	a	**Definition of signals and systems**: communication and control systems as examples **Classification of signals:** Continuous time and discrete time, even, odd, periodic and non periodic, deterministic and non deterministic, energy and power.	3	2,3
	b	**Operations on signals:** Amplitude scaling, addition, multiplication, differentiation, integration (accumulator for DT), time scaling, time shifting and folding, precedence rule. **Elementary signals:** Exponential, sine, step,	3	2,3

		impulse and its properties, ramp, rectangular, triangular, signum, sinc.		
	c	**Systems:** Definition, Classification: linear and non linear, time variant and invariant, causal and non - causal, static and dynamic, stable and unstable, invertible.	2	2,3

Unit – III

Teacher should facilitate learning of system analysis.

3	**System Analysis.**		Lecture required	Reference No.
	a	**System modeling:** Input output relation, impulse response, block diagram, integro-differential equation and state-space representation, definition of impulse response, convolution integral and convolution sum.	3	2,3
	b	Computation of convolution integral using graphical method, Computation of convolution sum by all methods.	3	2,3
	c	Properties of convolution, system interconnection, System properties in terms of impulse response, step response in terms of impulse response.	3	2,3

Unit – IV

Teacher should facilitate learning of passive filter design.

4	**Passive Filter Design.**		Lecture required	Reference No.
	a	**Introduction to various approximation techniques** : Butterworth and Chebyshev approximation, derivation of normalized low pass filter transfer function up to 3rd order by Butterworth approximation from basic principles.	3	4,5
	b	Evaluation of transfer function for Chebyshev filters from pole zero plots, Synthesis of above mentioned filters with 1ohm	2	4,5

		termination		
	c	Frequency transformation to high pass, band pass and band stop forms from normalized low pass filter. frequency scaling and Impedance scaling	3	4,5

Unit – V

Teacher should facilitate learning of active filter design.

5	**Active Filter Design.** .		Lecture required	Reference No.
	a	Factored forms of the functions, cascade approach, Biquad topologies: positive and negative feedback topology,	3	4,5
	b	coefficient matching techniques for obtaining element values , Sallen Key low pass circuits	3	4,5
	c	RC to CR transformations for high pass filter, design of Sallen Key band pass circuit, Substitution of passive elements by FDNR, Gyrator, GIC.	3	4,5

References:

1. A. Chakrabarti," Circuit Theory", DHANPAT RAY & CO.
2. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley India.
3. Charles Phillips, "Signals , Systems and Transforms" , 3rd Edition, Pearson Education.
4. Gobind Daryanani, "Principles of Active Network Synthesis and Design", Wiley international.
5. Lawrence Huelsman, "Active and Passive Analog Filter Design", McGraw-Hill Inc.

Biomedical Engineering

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

Unit - I

Teacher should facilitate learning of medical basics along with the applied engineering.

1	Introduction to the Biomedical Instrumentation and Measurement:		Lecture required	Reference No
	a	Basics of biomedical Instrumentation system.	1	1
	b	Anatomy and Physiology of the Human Body.	1	1
	c	Cells & Generation of potential in Body, Body potential.	1	1
	d	Transducers And Sensors: Transducers: Pressure transducers.	1	1
	e	transducer for temperature measurement Ultrasonic Transducers.	1	1
	f	Sensors: Pulse sensors Respiration sensors, Optical sensors.	1	1
	g	Recorder and displays: Permanent magnet moving coil instruments,PMMC writing system , X-Y Recorders.	1	1
	h	Medical oscilloscopes: Multibeam oscilloscope, Nonfade oscilloscope.	1	1
	i	Digital storage oscilloscopes. Bedside monitor.	1	1

Unit - II

Teacher should facilitate learning of Anatomy of heart & function of heart.

2	The Anatomy of Heart; Function of Heart:		Lecture required	Reference No
	a	The circulatory system, Electro conduction system of the heart.	1	1
	b	Electrocardiographs, ECG waveforms, Standard lead system.	1	1
	c	ECG measurements: ECG preamplifier, Readout device.	1	1
	d	Heart problems: Heart blocks; Pacemakers: Pacemakers, Types of Pacemakers.	1	1
	e	Defibrillators:Ventricular Fibrillation.	1	1
	f	Heart rate measurement:Cardiotachometers, Average Heart rate meter.	1	1
	g	Electrode theory; Biopotential electrode : skin surface,Suction pastelessdisspossible& air jet electrode. Unipolar & bipolar limb system eithoven triangle.	1	1
	h	Blood pressure measurement : introduction &techniques	1	1

Unit - III

Teacher should facilitate learning of human nervous andmuscular system.

3		The Human Nervous and Muscular System:	Lecture required	Reference No
	a	The Nervous System: The peripheral nervous system, Central nervous system.	1	1
	b	Anatomical and physiological parameter of brain, Behavior and Nervous system.	1	1
	c	Study of Brain Signals: Different wave form of the Brain, Evoked potential.	1	1
	d	Type of electrodes; EEG Amplifier: Recording the EEG signals Electrode: micro & needle electrode.	1	1
	e	Artifacts:Processing Artifacts;Analysis of Disease using EEG&sleep patterns; Electromyography.	1	1
	f	(EMG): How muscles work, paralysis, myograph, Nerve conduction velocity.	1	1

Unit - IV

Teacher should facilitate learning of Human Respiratory System and Its Measurements.

4		Human Respiratory System and Its Measurements	Lecture required	Reference No
	a	Respiratory Measurements; Spirometer; Respiratory gas analyzers infra-red gas analyzer.	1	1
	b	Oxygen analyzer, nitrogen analyzer; 8-channel EEG system.	1	1
	c	Blood: Measurement of blood flow, Radiographic technique, Indicator Dye dilution methods.	1	1
	d	Thermal convection, Magnetic blood flow rate, Ultrasonic blood flow meter.	1	1
	e	Blood gas Pressure:Blood gas analyzer, PH measurement of blood.	1	1
	f	Oximetry: Measurement of partialpressure of CO2 in blood, Measurement of blood PaO2, In vitro Oximetry.	1	1
	g	Patient Safety:Galvanic skin resistance; Patient safety: Macro shock, Macrocurrent shock.	1	1
	h	Block diagram of visual &auditory evoked potential system.	1	1

Unit - V

Teacher should facilitate learning of Imaging Techniques & telemetry system.

5	**Imaging Techniques & telemetry system.**		**Lecture required**	**Reference No**
	a	Imaging Techniques: X ray imaging and CT Scan: Properties of X ray Production of X ray.	1	2
	b	Application of X ray in medicine, CAT Scan.	1	2
	c	X-raytherapy; Digital radiography.	1	2
	d	Ultrasound therapy units: physics, medical ultrasound,basic pulse echo system.	1	1
	e	Instruments of surgery: Principle, type of electro-surgery technique.	1	1
	f	Surgical diathermy machine, electrode used for surgical diathermy.	1	1
	g	Safety aspects in electro-surgical units, microwave diathermy.	1	1
	h	Telemetry: single channel telemetry ; ECG telemetry.	1	1
	i	Temperature telemetry; multichannel telemetry.	1	1

References:

1) R.S.Khandpur - Bio-medical Instrumentation , TMH 2nd ed
2) Nandini K. Jog - Electronics in Medicine and Biomedical Instrumentation, PHI.
3) Cromwell - Biomedical Instrumentation and Measurements, PHI. 2nd ed/Pearson 4th ed
4) H. S. Kalsi – Electronics Instrumentation, TMH 2nd ed

Control System Techniques

Teacher, Paper setter and Examiner should follow the guidelines as given below.
Teacher should facilitate to learning of basic control system.

Unit I

1.		**Introduction to control system**	**Lecture required**	**Reference no.**
	a	Introduction to control system, Adaptive control, Mathematical Models of physical systems.	2	1
	b	Reduction of parameter variation by use of feedback, Control over system dynamics by use of feedback, control of effect of disturbance single by Use of feedback ,Linearizing effect and Regenerative feedback.	1	1
	c	Block diagram Algebra.	2	1
	d	Signal flow graph – mason's gain formula.	3	1

Unit II

Teacher should facilitate to learning of system response and stability.

2.			**Lecture required**	**Reference no**
	a	Standard test signals, Time Response of first order system and second order system.	2	1
	b	Time Response specification, Steady state analysis : Steady state error and error constants Stability ,necessary condition for stability, Routh- Hurwitz criterion.	3	1
	c	Root locus concept- Plotting root locus. Design of compensator using root locus.	3	1

Unit III

Teacher should facilitate to learning of Bode, Nyquest plot and stability.

3.			**Lecture required**	**Reference no**
	a	Correlation between time and frequency response.	1	1
	b	Bode plot: Gain margin, phase margin, stability. Design of compensator using bode plot.	4	1
	c	Polor plot Nyquestplot : criterion , stability using Nyquest plot.	3	1

Unit IV

Teacher should facilitate to learning of state models.

4.			**Lecture required**	**Reference no**
	a	Review of state space , state model for continuous time system.	1	1
	b	controllability, observability, solution of state equation. State feedback using pole placement.	4	1
	c	Observer. Ackermann's formula.	3	4

Unit V

Teacher should facilitate to learning of PLC.

5.		**PLC**	**Lecture required**	**Reference no**
	a	Block diagram, system components, operation of PLC, scan rate,ladder diagram,, logical function, PLC wiring, internal relays, sequencers.	2	1,4
	b	flip-flops,timers, counters, shift register, Mnemonic programming, PLC power connection.	3	4
	c	various types of PLC input and output circuits, analogue I/O, selection of PLC, connecting sensors with PLC.	3	4

References:

1. I.J. Nagrath & M. Gopal- Control system Engineering- New age international Publisher. 4th Ed.
2. Katsuhiko Ogata – Modern Control Engineering – Pearson education publication, 4th ed.
3. Ashok kumar – Control system – Tata Mcgraw – hill Publication Company.
4. Automatic control Engineering – Raven F. H McGraw Hill, 5th edition,1995.
5.5. Bolton - Mechatronics , Pearsons ,3/ed.

Industrial Organization & Management

UNIT I:

1.	**Introduction to business, Industry and management**		**Lecture required**	**Reference**
	a)	Management: various definitions, nature, importance	1	1,2,4
	b)	Overview of business- Types of Business: service, manufacturing, trade.	2	1,2,4
	c)	Industrial sectors: Introduction to Engineering industry Process industry – Evolution & operation Textile industry – History, Evolution & operation Chemical industry - Evolution & operation Agro industry - History, traditional and modern type & role in GDP	2	1,4,5
	d)	Globalization Introduction Advantages & disadvantages with respect to India	2	1 & 2
	e)	Intellectual Property Rights: Copy right, Trade mark, Patents	1	1 & 2

UNIT II:

2.	**Management Process**		**Lecture required**	**Reference**
	a)	Evolution of management thought, Concept of Management , Administration and Management,	1	1,2,10
	b)	Scientific Management by F W Taylor	1	1,2,10
	c)	Principles of Management (14 principles of Henry Fayol)	1	1,2,10
	d)	Levels and skills of management	1	1,2,10
		Functions of Management: Planning: types, features & importance Organizing Directing Controlling	3	1,2,10
	e)	Decision Making: Types- Individual and Group, Process and importance	1	1,2,10

UNIT III:

3.	Organizational Management		Lecture required	Reference
	a)	Organization : Definition, Steps in forming organization	1	1,3,5
	b)	Types of organization Line Line & staff Functional Project	3	1,3,5
	c)	Departmentation: Centralized & Decentralized Authority & Responsibility Span of Control	2	1,3,5
	d)	Forms of ownership: Process of formation, importance & disadvantages of - • Proprietorship • Partnership • Joint stock company • Co-operative Society • Govt. Sector	2	1,3,5

UNIT IV:

4.	Human Resource Management		Lecture required	Reference
	a)	Personnel Management Introduction, Definition, Functions	1	1,2,7,8
	b)	Staffing Introduction to HR Planning Recruitment Procedure	2	1,2,7,8
	c)	Personnel– Training & Development Types of training: Induction Skill Enhancement	1	1,2,7,8
	d)	Leadership & Motivation: Leadership Styles & types Motivation: definition, Intrinsic & Extrinsic Maslow's Theory of Motivation	3	1,2,7,8
	e)	Safety Management: Causes of accident Safety precautions	1	1,2,7,8

UNIT V:

5.	Ethical and Legislative Management		Lecture required	Reference
	a)	Ethics: Meaning of Ethics. Meaning, Moral & Ethics	1	2,11
	b)	Types of Ethics, Importance of Ethics, Nature of Ethics. Ethics in management	2	2,11
	c)	Qualities and social responsibility of successful manager	1	1,2,11
	d)	Introduction, Objectives & feature of Industrial Legislation:	1	1,2,11
	e)	Introduction to Factory Act ESI Act Workmen Compensation Act Industrial Dispute Act	3	1,2,11

Reference Books:

1. Dr. O.P. Khanna - Industrial Engg & Management (Dhanpal Rai & sons New Delhi)
2. Dr. S.C. Saksena - Business Administration & Management (Sahitya Bhavan Agra)
3. W.H. Newman, E.Kirby Warren, Andrew R. McGill- The process of Management(Prentice- all of India Pvt. Ltd. New Delhi - 110001)
4. Rustom S. Davar - Industrial Management (Khanna Publication)
5. Banga & Sharma - Industrial Organisation & Management (Khanna Publication)
6. Jhamb & Bokil - Industrial Management (Everest Publication, Pune)
7. Koontz – Principles of Management (Tata McGrew Hill, 1st Edition 2008)
8. L.M. Prasad – Principles & Practices of Management (Sultanchand & Sons, New Delhi)
9. Robbins & Caulter – Management (Prentice Hall of India, 8th Edition)
10 Parag Diwan – Management Principles and Practices (Excel Books, New Delhi)
11 Gautam Pherwani - Business Ethics

Microcontroller Systems Lab

Teacher should facilitate learning following lab experiments:

Title of Experiments		Lab hours Required
1	Study of 8051 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)	2
2	Write and Execute program to flash LED	2
3	Write and Execute program to display 0 to 9 continuously on 7-Segment display	2
4	Write and Execute program to demonstrate interfacing of 4 X 4 matrix Key-Board	2
5	Write and Execute program to demonstrate interfacing of multiplexed 7-Segment display.	2
6	Write and Execute program to demonstrate interfacing of Liquid Crystal display	2
7	Write and Execute program to demonstrate interfacing of DAC.	2
8	Write and Execute program to demonstrate interfacing of ADC.	2
9	Write and Execute program to demonstrate interfacing of Stepper Motor.	2
10	Write and Execute program to demonstrate Serial data Transmission.	2
11	Write and Execute program to demonstrate Serial data Reception.	2
12	Write and Execute program to demonstrate interfacing of Serial EEPROM 93C14 / 56 / 66 or 24C16 / 32 / 64.	2
13	Write and Execute program to demonstrate interfacing of RTC DS1307	2

References:

1. Kenneth J. Ayala - 8051 Microcontroller, PHI.
2 Mazidi and Mazidi - The 8051 Microcontroller and Embedded Systems, Pearson.2nd ed
3. Ajay V Deshmukh: Microcontrollers- Theory and applications TMH.
4) Rajkamal-Embedded Systems-Architecture,programming and design,2nd Edition,TMH

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.

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 8. Evaluation will be based on paper work and performance in the practical.

Network System & Filter Design Lab

(Note: Minimum FOUR Experiments from each group.)

Group A		Lab hours required
1	**Sketch and write defining mathematical expression for the following signals in CT**. Unit Step, Rectangular, Exponential, Signum, Sine, Sinc, Triangular, Unit impulse, Unit ramp.	02
2	**Classify and find the respective value for the following signals Periodic / Non Periodic and Energy / Power /Neither.** Unit Step, Rectangular, Exponential, Signum, Sine, Sinc, Triangular, Unit impulse, Unit ramp.	02
3	**Take any two CT signals and perform the following operation on:** Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time ,shifting and folding.	02
4	Express any two system mathematical expressions in input output relation form and determine whether each one of them is, Memory less, Causal, Linear, Stable, Time in variant, Invertible.	02
5	Express any two system mathematical expressions in impulse response form and determine whether each one of them is, Memory less, Causal, Linear, Stable, Time in variant, Invertible.	02
Group B		Lab hours required
1	Design and test a second order Butterworth low pass filter Sallen Key circuit	02
2	Design and test a second order Butterworth high pass filter Sallen Key circuit	02
3	Design a second order Chebyshev low pass filter Sallen Key circuit.	02
4	Design a second order Chebyshev high pass filter Sallen Key circuit.	02
5	Design a second order Chebyshev band pass filter Sallen Key circuit.	02

References:

1. A. Chakrabarti," Circuit Theory", DHANPAT RAY & CO.
2. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley India.
3. Charles Phillips, "Signals , Systems and Transforms" , 3rd Edition, Pearson Education.
4. Gobind Daryanani, "Principles of Active Network Synthesis and Design", Wiley international.
5. Lawrence Huelsman, "Active and Passive Analog Filter Design", McGraw-Hill Inc.

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Biomedical Engineering Lab

(Note: Minimum FOUR Experiments from each group.)

Group A		Lab hours required
1	Study of blood pressure measurement .(Non-invasive and simulation of invasive)	02
2	Study of ECG amplifier to measure amplitude and frequency components.	02
3	Measurement of pulse Rate.	02
4	Study of measurement of temperature of human body direct and indirect method.	02
Group B		Lab hours required
1	Study of pace maker unit to compare the operation of heart with the normal functioning of heart.	02
2	Study of blood cell counter to measure cell counts.	02
3	Study of spectrophotometer.	02
4	Use of ultrasound in medical electronics.	02
5	Study of temperature telemetry system to measure the recevied data	02

Guide lines for ICA:
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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 8. Evaluation will be based on paper work and performance in the practical.

Control System Techniques Lab

LAB COURSE CONTENT

(Note: Minimum EIGHT Experiments from the list.)

Sr. No.	Name of the Experiments	Lab Hours
1	To plots poles and zeros of a system.	2
2	To obtain the impulse and step response of the system.	2
3	To find the transfer function of given system using block diagram reduction andplot poles and zeros of the system.	2
4	To find the system response of the system using Bode plot.	2
5	To find the system response of the system using Root locus.	2
6	To find the system response of the system using Nyquest plot.	2
7	To find the frequency response of the LEAD network.	2
8	To find the frequency response of the LAG network.	2
9	To find the frequency response of the feedback amplifier.	2
10	To find the system response of the system using Polar plot.	2
11	Study the specification and operation of PLC and its programming.	2

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.

Electronics Workshop Practice- I Lab

THEORY COURSE CONTENTS

Teacher should facilitate basic of open source simulation and circuit design tools.

Sr. No.	Content	Lecture Required	Reference No.
1	Installation of Scilab, Basic matrix operations	1	1
2	Basics element of language – Creating real variables, Variable name, Comments and continuation lines, Elementary mathematical functions, Pre-defined mathematical variables, Boolean, Complex number, String, Dynamics type of variables.	1	1
3	Matrices- create a matrix of real value, The empty matrix, Query matrix, Accessing the elements of matrix, low level and element wise operation, High level linear algebra features.	1	1
4	Looping and Branching- The statement are if, while, select, for, break.	1	1
5	Plotting- 2D plot, Title, axis and legends, Export.	1	1
6	Functions- Overview, Defining a functions, Function libraries, managing output arguments.	1	1
7	Installing and setting up Oscad.	1	2
8	Architecture of Oscad- Modules used in Oscad, work flow of Oscad.	1	2
9	Getting started – Schematic Editor, analysis inserter, netlist converter, Ngsipce, Footprint editor, layout editor, model builder, subcircuitbuilder	1	2
10	Schematic Creation- Famillarising the Schematic editor interface, Components and component libraries, schematic creation for simulation	1	2
11	Simulation- Analysis Inserter, Modifying Ki Cad netlist for Ngspice simulation, examples.	1	2
12	PCB Design- schematic creation for PCB, Creation of PCB layout	1	2

LAB COURSE CONTENTS

(Note: Two Experiments in each group)

Group A		Lab hours required
	Simulation of analog circuits using any software tool: simulation tool.	
1	To find voltage and current of the given network using	02
2	To find transfer / Driving point impedance of two port network.	02
3	To design and test active filter.	02
4	Frequency domain analysis of given filter.	02
Group B		
	Simulation of digital circuits using any software tool:	
1	Combinational Logic Circuits- Multiplexer, Demultiplexer, Decoder, Encoder (Any One)	02
2	Sequential Logic Circuits- Flip-Flops, Counter, Register (Any One)	02
Group C		
	Simulation of control systems, analog systems using any software tool:	
1	**Control Systems-** Pole-Zero plot, polar/ Nyquist plot, Transient response (Any One)	02
2	**Analog Systems-** Generation ofstandard signals, Operations on signals, Transformation (Laplace) (Any One)	02
Group D		
1	**Applications of MATLAB/ Scilab to Electronics Engineering subjects (2 Practicals)**	04

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

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Syllabus for
Third Year Electronics Engineering
Faculty of Engineering and Technology

TEACHER AND EXAMINER'S MANUAL

SEMESTER – VI

W.E.F 2014 – 2015

Electromagnetic Engineering

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

Unit - I

Teacher should facilitate learning of basics of electrostatics, calculation of electric field intensity, flux density, energy, potential and work.

1	**Electrostatics**		**Lectures Required**	**Reference No.**
	a	Vector analysis	2	1
	b	Coulomb's law, Electric field due to line charge (Derivations and numericals)	2	1
	c	Electric field due to Sheet charge and volume charge Densities (Derivations and numericals)	2	1
	d	Electric flux density, Gauss's law and Divergence theorem. (Numerical)	2	1
	e	Energy, Potential and Work-done, Potential gradient. (Numerical)	2	1
	f	Dipole and its electric field, Dipole movement. Energy density in electrostatic field.	2	1

Unit - II

Teacher should facilitate learning of properties of conductors and dielectrics and energy of capacitors.

2	**Conductor, Dielectrics and Capacitance**		**Lectures Required**	**Reference No.**
	a	Current and current density. Current continuity equation	1	1
	b	Properties of conductors, Boundary conditions between conductor and free space (Numerical expected)	1	1
	c	Boundary conditions between conductor and dielectric (Numerical expected)	1	1
	d	Energy stored in capacitors between parallel plates and co-axial cable (Numerical expected)	2	1
	e	Poisson's and Laplace's equations.	1	1

Unit - III

Teacher should facilitate learning of basics of magnetostatics, calculation of magnetic field intensity, flux density, potential and energy density.

3	**Magnetostatics**		**Lectures Required**	**Reference No.**
	a	Biot-Savarts law and its vectorial form, Magnetic field due to infinitely long current carrying conductor (No Derivation)(Numerical expected)	2	1
	b	Ampere's Circuital law. Application to co-axial cable.	2	1

		(Numerical expected)		
	c	Curl operator, Magnetic flux density Stoke's theorem (Numerical expected)	2	
	d	Scalar and Vector magnetic potential. Lorentz's Force equation Energy stored in magnetic field. (Numerical expected)	2	1

Unit - IV

Teacher should facilitate learning of properties and laws of time varying field and also basics of transmission line.

1	**Time Varying Fields**		**Lectures Required**	**Reference No.**
	a	Faradays law, Maxwell's equations (Differential, Integral. Uniform plane waves. Maxwell's equations (Phasor forms)	1	1
	b	Representation of wave motion in free space, Representation of wave motion in perfect dielectrics and Lossy dielectrics (Wave equations). (Numerical expected)	3	1
	c	Poyinting Theorem and Power density	1	1
	d	Propagation in good conductor and Skin effect	1	1
	e	Reflection of Uniform plane waves. VSWR	1	1
	f	**Transmission Line**: - Impedance matching, Single stub and Double stub transmission line. Introduction to Smith Chart.(No numericals)	1	1

Unit - V

Teacher should facilitate learning of basics of waveguide and different antenna parameters.

1	**Radiation and antennas(No numericals)**		**Lectures Required**	**Reference No.**
	a	Waveguides: modes in rectangular waveguides; boundary conditions; cut-off frequencies	1	2
	b	Dispersion relations, Basics of propagation in dielectric waveguide	1	2
	c	Radiation resistance, Radiation pattern (Numericals Expected)	1	2
	d	Calculation of Radiation resistance for short dipole, Short monopole, Half-wave dipole and Quarter-wave monopole antennas	1	2
	e	Directivity, Reciprocity between Transmitting and Receiving antennas	1	2
	f	Hertzian dipole, Types of Antennas: - Folded dipole, Yagi-uda, Horn antenna	1	2

	e	Principle pattern multiplication, General pattern of two isotropic radiators.	1	2

References:

1) W. Hayt - Engineering Electromagnetics, TMH. (5^{th} or 7^{th} 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.
6) Jordan E. C. and K. G. Balman- Antenna Theory and Design, PHI 2^{nd} edition.

Communication System- II

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

Unit – I

1	Communication &Television Fundamentals		Lecture required	Reference No
	a	Power measurements	1	1
	b	Electronics communication system	1	1
	c	EM spectrum, bandwidth and information capacity.	1	1
	d	Introduction, picture transmission, television transmitter	1	3
	e	television receivers, synchronization	1	3
	f	Aspect ratio, image continuity, interlaced scanning.	1	2,3
	g	Camera tube types, monochrome camera tubes	1	3
	h	colour cameras tubes, monochrome picture tubes	1	3
	i	composite video signal, Vestigial sideband transmission	1	3
	j	Television systems and standards : NTSC, PAL, Mono chrome system.	1	3
	k	Cable T.V. Introduction, signals sources, processing	1	3
	l	bidirectional networks, converters, digital system hardware	1	3
	m	Introduction to DTH, 3D T.V etc.	1	3
	n	EDTV, HDTV	1	3

Unit II

2	Telephone Instruments and Signals		Lecture required	Reference No
	a	Introduction, subscriber loop, standard telephone set	1	1
	b	block diagram of Telephone set, basic telephone call producer	1	1
	c	call progress tone and signals, DTMF,	1	1
	d	Caller ID system, cordless telephones	1	1

	e	electronic telephones, paging systems	1	1
	f	Introduction, , local loop, transmission parameters	1	1
	g	voice frequency circuit arrangements, Echo suppressors	1	1
	h	Echo cancellers &Crosstalk	1	1

Unit III

3	**Microwave Radio Communication and Systems**		**Lecture required**	**Reference No**
	a	Introduction, advantages and disadvantages, analog vs. digital microwave	1	1
	b	FM microwave radio system, radio repeaters	1	1
	c	Diversity and its types	1	1
	d	protection switching arrangements,	1	1
	e	FM microwave radio stations, repeater stations	1	1
	f	RADAR: principles, block diagram, radar frequency	1	4
	g	power used in radar, radar range equation	1	4
	h	pulse radar system, antenna and scanning, ,	1	4
	i	Display methods ,Introduction to MTI and CW radar system.	1	4

Unit IV

4	**Cellular Telephone Concepts**		**Lecture required**	**Reference No**
	a	Introduction, Mobile telephone Service, Evolution of Cellular Telephone	1	1
	b	Cellular Telephone, frequency reuse	1	1
	c	Interference,Cell Splitting,sectoring,Segmentation and dualization	2	1
	d	cellular system topology,roaming and handoff,	1	1

	e	cellular telephone network components,cellular telephone call processing	1	1
	f	Multiplexing And Multiple Acess Techniques: FDMA,TDMA	1	1
	g	CDMA,spread spectrum	1	1

Unit V

5	**Satellite Communication**		**Lecture required**	**Reference No**
	a	Introduction, History of satellite, Kepler's Law	1	1
	b	Satellite orbits	1	1
	c	Geo-synchronous satellites	1	1
	d	Antenna look angles, satellite classifications, spacing and frequency allocation,	1	1
	e	Satellite Antenna, Radiation Patterns And Foot Prints.	1	1
	f	Satellite system link models, parameters	1	1
	g	link equations, link budget.	1	1

Reference Books:

1. Tomasi – Electronics Communication Systems, TMH, 5/e.
2. R.G.Gupta – Audio Video System ,TMH
3. R.R Gulati- Modern Television Practice , New age, 2/e
4. George Kennedy- Electronics Communication Systems,TMH,5/e
5. Roddy-Satellite Communication,MGH,4/e

Electronic Measurement Techniques

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

Unit - I

Teacher should facilitate learning of transducers, measurement and conversion and basics of converters.

1	Sensors and converters		Lecture required	Reference No
	a	Linear Variable Differential Transducer	1	2
	b	Resistance Strain Gauges, Capacitance Sensors.	1	2
	c	Pressure gauges; Elastic Pressure Transducers, Ultrasonic transducer	2	2
	d	Restriction type Flow meters-Orifice and Venturi; Rotameter	2	5
	e	V to F and F to V converter, Instrumentation Amplifier	1	2
	f	Smart Sensors	1	5

Unit - II

Teacher should facilitate learning construction, working, operation and applications of analog and digital instruments.

2	Analog and Digital Instruments		Lecture required	Reference No
	a	**LCR-Q meter (Numerical Expected)** Principle, Diagram & operation of LCR-Q meter and its applications	2	1,2
	b	**Vector voltmeter** Ckt. Diagram & operation of vector voltmeter	1	1
	c	**Electronic multimeter** Ckt. Diagram & operation measurements **Output power meter** Ckt. Diagram & operation	2	2
	d	**Vector impedance meter (**Ckt. Diag., operation applications) **Field strength meter.** (Ckt. Diagram , operation applications)	1	2
	e	Digital counters and timers, Basic counter circuitry, main gate, Time base control circuit, Frequency measurement,	3	2

		measurement errors, Ratio of frequency measurement.		
	f	**Digital tachometer, Phase meter, capacitance meter** Ckt. Diagram ,operation & applications	1	2

Unit - III

Teacher should facilitate learning of Basic wave generators and analyzers and construction, working, operation and applications of generators and analyzers.

3	**Signal Generators and Analyzers**		**Lecture required**	**Reference No**
	a	**Sweep generator, Sweep marker generator** Ckt. Diagram , operation and applications	2	2
	b	**Colour bar generator, Vectroscope** Ckt. Diagram , operation and applications	1	2
	c	**Basic wave analyzer, Frequency selective wave analyzer** Ckt. Diagram, operation and applications.	1	2
	d	**Harmonic distortion analyzer,** Ckt. Diag., operation and applications	1	2
	e	**spectrum analyzer ,Wobbuloscope** Ckt. Diagram, operation and applications.	2	2
	f	**signature analyzer, OTDR meter** Ckt. Diagram , operation and applications	1	2

Unit - IV

Teacher should facilitate learning of Basic Oscilloscope, types operation and measurements with Oscilloscopes and additional circuitry.

4	**Oscilloscope**		**Lecture required**	**Reference No**
	a	**Introduction, principle, feature, block diagram of Oscilloscope**	1	2
	b	**sweep types, CRT diagram, CRT basics**	1	2
	c	**PDA Tubes, Dual beam CRO** Block Diagram, operation and applications	1	2
	d	**Dual trace CRO** Block Diagram, operation and applications , comparison.	1	2
	e	**VHF oscilloscope** Block Diagram, operation and applications	1	2
	f	**VLF signal scope (analog storage and digital storage scopes)** Block Diagram, operation and applications	1	2

	g	**Digital read out scopes**	1	2
	h	**Probes for CRO** Direct , passive voltage and active **Attenuators** Compensated and uncompensated **Fiber optic CRT, hall effect probe**	2	2
	i	**Power scope**	01	02

Unit - V

Teacher should facilitate learning of Basic Data Acquisition and Transmission systems

5	**Data Acquisition and Transmission systems**		**Lecture required**	**Reference No**
	a	Objectives of DAS, single channel DAS(Construction & operation)	01	02
	b	**Multi channel DAS, ATS** Construction & operation	01	02
	c	**Computer based testing of audio amplifier, radio receiver.**	01	02
	d	**Data loggers** (Block Diagram & operation) **digital transducers**	01	02
	e	**Introduction to Programmable logic controller, Interfacing transducer to electronic control.**	01	02
	f	**Computer aided measurements,** **Introduction to Data transmission systems** Block Diagram, Working	01	02
	g	**Advantages and disadvantages of digital over analog transmission.**	01	02
	h	**Introduction to MODEMs.** **Data communication System using Modems**	01	02

References:

1)Helfrick and Cooper – Modern Electronics Instrumentation and Measurement Techniques,Pearson

2) H. S. Kalsi – Electronics Instrumentation, TMH 2nd Ed

3) Alan S. Morris – Measurements and Instrumentation Principles, Butterworth Heinemann

4) Deoblin – Measurements systems: Applications and Design, TMH 5th ed

5) Nakra, Choudhari -- Instrumentation Measurements and analysis, 2/E TMH

Electronic Circuit Design

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

Unit - I

Teacher should facilitate learning basics of unregulated and regulated power supplies and its design procedure. It includes design of discrete and IC based power supplies.

1	**Design of Power Supplies**		Lecture required	Reference No
	a	Design of Unregulated power supply, selection of transformer, diodes, capacitors, calculation of surge resistance (using bridge rectifier and capacitor filter only).	2	1,2
	b	Design of Discrete series regulated power supply with protection circuit (simple and fold back).	2	1
	c	Design of regulated power supply using IC LM- 340 series and IC LM- 340 series along with heat sink calculations.	2	2
	D	Design of Dual power supply using LM-317 and LM 337 IC's along with heat sink calculations.	1	2
	e	Design of switching regulators, Buck regulator, Boost regulator, and Buck – Boost using switching regulator IC–LM 1577/2577 along with heat sink calculations	2	2

UNIT- II

Teacher should facilitate learning basics of various transistor configurations (BJT/FET),Design procedure for bias networks and amplifier design, basics of feedback amplifier topologies and their design concepts.

2	**Design of Small Signal (Voltage) Amplifier BJT / FET**		Lecture required	Reference No
	a	Design of Bias circuits (BJT/FET): For BJT- Voltage divider bias circuit. For FET-self bias circuit and Voltage divider bias circuit.	1	1,4
	b	Design of single stage amplifiers for CE / CS, CB / CG, CC / CD configurations (design of bias network and calculations of bypass and coupling capacitors).	4	1,4
	c	Designing of negative feedback amplifiers:-voltage series, voltage shunt, current series and current shunt topology. (design of bias network, feedback network and calculations of bypass and coupling capacitors).	4	1,4

Unit – III

Teacher should facilitate learning of basics of different classes of power amplifiers and their design implementation procedure.

3	**Design of Large Signal (power) Amplifiers**		Lecture required	Reference No
	a	Class – A transformer coupled power amplifier [design of bias network, transistor ratings and transformer rating calculations]	2	1,4
	b	Class –B Push-pull amplifier [design of bias network, transistor ratings and transformer rating calculations].	2	1,4
	c	Class - AB [Push-pull amplifier and complementary symmetry amplifiers] [design of bias network, transistor ratings and transformer rating calculations].	2	1,4
	d	Monolithic power amplifier design using power amplifier IC LM-379.	2	

UNIT- IV

4	**Design of High Frequency Amplifier**		Lecture required	Reference No
	a	Design of Tuned amplifier using BJT / FET single tuned amplifier [design of bias network: voltage divider bias for BJT and self bias and voltage divider bias for FET, tuned network and calculations of bypass and coupling capacitors].	2	4
	b	Design of cascode amplifier [CE-CB].	1	4
	c	Design of oscillator circuits using BJT/FET : Clapp, Colpitt and Hartley oscillator [design of bias network: voltage divide bias for BJT , self bias and voltage divider bias for FET, tank circuit , calculations of bypass and coupling capacitors].	3	4
	d	Design of switching circuits: Astable multivibrator using BJT [design of bias network: and time constant circuits for variable duty cycle] and Monostable multivibrator using BJT. [design of bias network: and time constant circuits for variable pulse width]	2	6

UNIT- V

5	**Design using Analog Integrated Circuits.**		Lecture required	Reference No
	a	Design of Single supply amplifiers using OP-Amp IC-741/324 (AC inverting, AC Non inverting amplifiers)	2	2,3
	b	Instrumentation amplifier design using IC-AD – 620	1	2,3
	c	Design of V - I converter, I - V converter, V – F and F – V converter using OP-Amp .	1	2,3
	d	Design of Non-linear circuits: Voltage comparators , Peak detectors. , True RMS converter.	1	2,3
	e	Sallen-key active filter design :for N^{th} order Sallen-key low pass, high pass, band pass and band reject filter, [Using unity gain and equal component circuit design approach for Butterworth and Chebyshev response].	3	2,3

References:

1) M.M. Shah - Design of Electronics Circuits and Computer Aided Design , Wiley Eastern .
2) Michael Jacob - Application and Design with Analog Integrated Circuits, PHI 2/e
3) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH , 3/e.
4) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e
5) Martin S Roden , Gordon – Electronics Design ,Shroff Pub. - 4/e.
6) Bell – Solid State Pulse Circuits, PHI 4/e

Entrepreneurship & Business Planning

UNIT I:

1.	**Introduction of Entrepreneurship**		**Lecture required**	**Reference**
	a)	Introduction of Entrepreneur and Entrepreneurship: Definition, Concept, meaning	2	2,5,10
	b)	Entrepreneur and Entrepreneurship: Function, need and importance	1	2,5,10
	c)	Entrepreneurship Characteristics and competency, Relevance of Entrepreneurship to socio economic gain	2	2,5,10
	d)	Problem of unemployment & important of wealth creation and self employment,	1	2,5,10
	e)	Micro, small and medium Enterprise, Enterprise v/s Entrepreneurship	1	2,5,10
	f)	Self employment v/s Entrepreneurship, Entrepreneurial career as an option.	1	2,5,10

UNIT II:

2.	**Business Planning**		**Lecture required**	**Reference**
	a)	Business Planning: Introduction, Meaning, Definition, Characteristic & objective period.	2	1,3,8
	b)	Nature of Planning, Importance of planning, Advantages of planning, Steps in planning process.	1	1,3,8
	c)	Methods of planning, Limitations of planning, Essentials of a good planning, obstacles in planning.	2	1,3,8
	d)	Planning Premises and Classification of Planning Premises.	1	1,3,8
	e)	Qualities of good business plan, Business plan Components.	1	1,3,8
	f)	The elements of business plan, questions for every business plan.	1	1,3,8

UNIT III:

3.	Entrepreneurial and Business Opportunities		Lecture required	Reference
	a)	Process of Entrepreneurship development, Sensing Entrepreneurial opportunity	1	1,9,10
	b)	environmental scanning, market assessment, identification of Entrepreneurial opportunity	2	1,9,10
	c)	Selection of Enterprise, steps in setting up of an enterprise.	1	1,9,10
	d)	Small Business: Opportunities and Rewards	1	1,9,10
	e)	Small Business Entrepreneurs: Characteristics and Competencies,	1	1,9,10
	f)	Business Ideas: Creativity, Opportunity, Feasibility and Business Plans.	2	1,9,10

UNIT IV:

4.	Market Analysis		Lecture required	Reference
	a)	Financial Management- Objectives & Functions	1	6,7
	b)	Capital Generation & Management, Types of Capitals	1	6,7
	c)	Sources of raising Capital, Budgets and accounts	2	6,7
	d)	Types of Budgets: Production Budget, (including Variance Report), Labour Budget,	1	6,7
	e)	Introduction to Profit & Loss Account (only concepts); Balance Sheet,	2	6,7
	f)	Introduction to –Excise Tax, Service Tax, Income Tax, VAT, Custom Duty	2	6,7
	g)	Introduction to Share market: BSE, Nifty.	1	6,7

UNIT V:

5.	**Study of Entrepreneurs Biographies**		**Lecture required**	**Reference**
	a)	Pramod Choudhari: Life story, struggle, motivation, opportunity, first step as a Entrepreneur & achievements	2	4
	b)	Vitthal Kamat: Life story, struggle, motivation, opportunity, first step as a Entrepreneur & achievements	2	4
	c)	Dr. Neelkantha Kalyani: Life story, struggle, motivation, opportunity, first step as a Entrepreneur & achievements	1	4
	d)	Anu Aga: Life story, struggle, motivation, opportunity, first step as a Entrepreneur & achievements	1	4

REFERENCE BOOKS:

1. Desai Vasant : Management of Small Scale Industries, Himalaya Publishing House.
2. Taneja Satish and Gupta S.L. - Entrepreneurship Development – New Venture Creations – Galgotia Publishing Company, New Delhi
3. Gupta C.B. & Srinivas : Entrepreneurial Development, Sultan D, Chand & sons, New Delhi
4. Yogiraj Devkar 'Udogsandhi' : 'Shodha Mhanje Sapdel' continental Prakashan.
5. Katz, J. and Green, R. (2013). Entrepreneurial Small Business (4th. ed.). McGraw-Hill Irwin
6. Dr. O.P. Khanna - Industrial Engg & Management (Dhanpal Rai & sons New Delhi)
7. Dr. S.C. Saksena - Business Administration & Management (Sahitya Bhavan Agra)
8. Principles of Management – T. Ramasamy, Himalaya Publishing House
9. S.S. Khanna - Enterprenurial Development, (S. Chand & Comp. Ltd, New Delhi)
10 D.N.Mishra - Entrepreneur and Entrepreneurship Development and Planning in India, Chugh Publication, Allahabad.

Communication System-II Lab

Teacher should facilitate learning following lab experiments:

Group A		Lab hours required
1	Study the test points of Colour TV and observe various waveforms.	02
2	Fault Finding in Colour TV	02
3	Study the test points of Black And WhiteTV and observe various waveforms.	02
4	Fault Finding in Colour TV	02
Group B		Lab hours required
1	Study of the Telephone Demonstrator.	02
2	EPABX System	02
3	Establishing direct communication link between uplink transmitter and downlink receiver using tone signal.	02
4	Study Of GSM System	02

Guidelines 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.

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 8. Evaluation will be based on paper work and performance in the practical.

Electronic Measurement Techniques Lab

Teacher should facilitate learning following lab experiments:

(Note: Minimum FOUR Experiments from each group.)

	Group A	**Lab hours required**
1	Measurement of reactive and resistive components with LCR Q meter.	02
2	Study of true RMS meter / DMM for measurement of EMS value of any AC signal.	02
3	Measurement of frequency Time with the help of frequency counter.	02
4	Study of Digital Tacho meter for measurement of motor speed .	02
5	Measurement of distortion and nature of distortion by harmonic distortion analyzer.	02
6	Study of spectrum analyzer for its application.	02
	Group B	**Lab hours required**
1	Measurement techniques using CRO (frequency, amplitude, phase, time and component tester).	02
2	Study of DSO to measure and store frequency and amplitude.	02
3	Study of DATA loggers for various parameter measurements.	02
4	Study of computerized analysis of radio receiver and measurement of power with it.	02
5	Study of ATS.	02

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Guide lines for ESE:

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Electronic Circuit Design Lab

Teacher should facilitate learning following lab experiments:

(Note: Minimum 5 Experiments from following list)

	Title of Experiments	Lab hours required
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 340/317 series.	2
2	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	2
3	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}	2
4	Design of Transformer less class B push pull amplifier using BJT. For a) With cross over Distortion. b) Elimination of Cross over distortion.	2
5	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.	2
6	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.	2
7	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.	2
8	Design and test a sallen – key second order low pass / high pass filter for given specifications	2

References:

1) M.M. Shah - Design of Electronics Circuits and Computer Aided Design , Wiley Eastern .
2) Michael Jacob - Application and Design with Analog Integrated Circuits , PHI 2/e
3) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH , 3/e.
4) Bell - Electronics Devices and Circuits, PHI or Pearson 4/e
5) Bell – Solid State Pulse Circuits , PHI 4/e

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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 8. Evaluation will be based on paper work and performance in the practical.

Electronic Workshop Practice- II Lab

(Note: Each Experiment in two turns)

1. Perform following using DSO

a. Perform Roll, Average, and Peak detection operations on signal

b. Capture transients

c. Perform various math operations like addition, subtraction and multiplication of two waves.

2. Study of True RMS meter

a. Measure RMS, peak, average voltages for half controlled rectifier or Full controlled rectifier by varying firing angle.

3. Study of programmable LCR meter

a. Measure L, C & R

b. Measure Q and Dissipation factor.

4. Study of Spectrum Analyzer

a. Perform harmonic analysis and Total Harmonic Distortion (THD) measurement for sine and square waves.

b. Verify frequency response of filters & high frequency (HF) amplifier.

c. Analyze Spectrum of AM & FM and to measure percent modulation and bandwidth.

5. Study of Frequency Counter

a. Carry out measurements through different modes of measurement.

b. Measure frequency, time, ratio, events & pulse width.

6. Calibration of Digital Voltmeter (DVM)

a. Calibrate DVM for dc voltage, ac voltage and dc current.

References:

1. Manuals / Books of concern measuring instrument tools.

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.