NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Third Year Engineering

(E&TC/E&C)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – V

W.E.F 2014 – 2015

TE Semester – V

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Electronic Circuit Design (TH)	D	3	---	---	3	20	80	---	---	100	3
Communication System-II (TH)	D	3	---	---	3	20	80	---	---	100	3
Microcontrollers & Peripheral Interface Controller (TH)	D	3	---	---	3	20	80	---	---	100	3
Feedback Control System (TH)	D	3	---	---	3	20	80	---	---	100	3
Electromagnetic Engineering (TH)	D	3	--	---	3	20	80	---	---	100	3
Electronic Circuit Design (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Feedback Control System (LAB)	D	---	---	2	2	---	---	25	---	25	1
Communication System-II (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Microcontrollers & Peripheral Interface Controller (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Computer Programming-III (LAB)	B	1	---	2	3	---	---	50	---	50	2
Industrial Training / EDP / Special Study	D	---	---	---	---	---	---	25	---	25	2
Total		**16**	**---**	**10**	**26**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

TE Semester – VI

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Industrial Economics & Telecom Regulation (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (TH)	D	3	---	---	3	20	80	---	---	100	3
Electronic Measurement (TH)	D	3	---	---	3	20	80	---	---	100	3
Audio Video Engineering (TH)	D	3	---	---	3	20	80	---	---	100	3
Industrial Management (TH)	C	3	---	---	3	20	80	---	---	100	3
Power Electronics (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Electronic Measurement (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Audio Video Engineering (LAB)	D	---	---	2	2	---	---	25	25(PR)	50	1
Application Software (LAB)	B	---	---	2	2	---	---	25	---	25	1
Minor Project	D	---	---	2	2	---	---	50	---	50	2
Seminar - I	D	---	---	2	2	---	---	25	---	25	2
Total		**15**	**---**	**12**	**27**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Note 1: Out of 3 practical ESE heads, at least 1 head should be practical.

Electronic Circuit Design

COURSE OUTLINE

Electronic Circuit Design **ECD**

Course Title Short Title Course Code

Course Description:

This course presents the actual concepts of several electronic devices and circuits and the design details, in order to meet a given system specification.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Electronic Circuit Design **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Design of Power Supplies **No of Lect. – 8, Marks: 16**

a) Design of unregulated power supply (half wave and full wave bridge rectifier with only Capacitor filters)
b) Design of Series Voltage Regulator (with error amplifier), fold back protection circuit. Improvement of Stabilization factor by using Darlington pair for regulator.
c) Design of IC LM317/337 based only adjustable voltage regulator circuits, design of dual tracking power supply using LM317/LM337 with unregulated power supply.
d) Design of switching regulators using IC LM 2575 / 2577 (buck and boost regulators – fixed and adjustable output voltage)

Unit-II: Design of Small Signal Amplifiers using BJT / FET No of Lect. – 8, Marks: 16

a) Design of single stage CE / CS amplifier with biasing circuit.
b) Design of single stage CB / CG amplifier with biasing circuit.
c) Design of Single stage CC/ CD amplifier with biasing circuit.
d) Design of current series negative feedback amplifier using BJT / JFET.

Unit-III: Power and Tuned Amplifiers **No of Lect. – 8, Marks: 16**

a) Design of Class A Amplifier (resistive load and transformer coupled load)
b) Design of Class B amplifier.
c) Design of Class AB amplifier.
d) Design of single tuned amplifier BJT / FET

Unit-IV: Design of Oscillators **No of Lect. – 8, Marks: 16**

a) Design RC and LC Oscillators – RC Phase shift oscillator, Hartley, Colpitts and Clapp oscillator
b) Design of multivibrator - Design of collector coupled Astable multivibrator and collector coupled Monostable multivibrator using BJT
c) Design of UJT relaxation Oscillator, Design of Schmitt trigger using BJT.

Unit-V: Design using Analog Integrated Circuits **No of Lect. – 8, Marks: 16**

a) Design of single supply ac inverting and non-inverting amplifier using IC324.
b) Design of FSK modulator using IC555, Design of ramp generator using IC555
c) Design of V/F and F/V convertors using TC9400
d) Study of different ICs available for digital modulation techniques (PAM, PWM, PPI, ASK, FSK).

Reference Books:

1) 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) Sergio Franco – Design with OP-AMP and Analog Integrated Circuits, TMH, 3/e
8) IC datasheets.

Communication System-II

COURSE OUTLINE

Communication System-II **CS-II**

Course Title Short Title Course Code

Course Description:

This course is aimed at introducing the fundamentals of digital communication to undergraduate students. The background expected includes a prior knowledge of second year course in Communication System-I. The goals of the course are to understand the basic principle of digital communication and application in different era.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): Communication System-I.

COURSE CONTENT

Communication System-II **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE): 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Spectra, Probability and Random Variables **No of Lect. –9, Marks: 16**

a) Basic Signal Processing Operation in digital communication
b) Power density spectrum, Energy spectral density
c) Parseval's theorem, Rayleigh Energy theorem
d) Probability and sample space,
e) Random Variables, Random process and Probability Function.
f) Probability Models.

Unit-II: Waveform Coding and Baseband Shaping for Data Transmission **No of Lect. – 8, Marks: 16**

a) Pulse Code Modulation (PCM) & PCM with Noise.
b) Delta Modulation
c) Digital Multiplexing.
d) Discrete PAM Signals and Power Spectra of Discrete PAM Signals.
e) ISI & Nyquist's Criterion for Distortion less Baseband Binary Transmission.
f) Eye Pattern.

Unit-III: Digital Modulation Techniques **No of Lect. –9, Marks: 16**

a) Digital Modulation Formats
b) Coherent Binary Modulation Techniques
c) Coherent Quadrature Modulation Techniques
d) Noncoherent Binary Modulation Techniques
e) M-ary Modulation Techniques
f) Bit Vs symbol Error Probability and Synchronization

Unit-IV: Information and Detection Theory **No of Lect. – 8, Marks: 16**

a) Uncertainty, Information and Entropy
b) Source coding Theory
c) Huffman coding and Discrete Memory less Channels
d) Mutual Information, Channel Capacity and Channel Coding Theory
e) Differential Entropy and Mutual Information
f) Channel Capacity Theorem

Unit-V: Channel Coding **No of Lect. – 8, Marks: 16**

a) Coding introduction, Error probability with repetition in the binary symmetric channel.
b) Linear Block Codes
c) Algebraic Codes
d) Automatic repeat request

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 (PIC)

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC**	
Course Title	Short Title	Course Code

Course Description:

This course provides an Extensive knowledge about 8051 microcontroller, its programming, interfacing, applications and introduction to PIC.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	**14**	**42**	**03**

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

COURSE CONTENT

Microcontrollers & PIC **Semester-V**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: The 8051 Microcontroller **No of Lect. – 8, Marks: 16**

a) Overview of the microcontroller Family, Block diagram description of 8051.
b) Memory and Register organization.
c) Stack and operation of stack. Stack related instructions.
d) Looping, Conditional and Unconditional Jumps, Subroutines, Time delay calculations, CALL and RET Instruction.
e) 8051 pin diagram, understanding the function of each pin.
f) I/O port structure and I/O port programming.

Unit-II: 8051 Programming **No of Lect. – 8, Marks: 16**

a) Addressing Modes in 8051.
b) Instruction set of 8051 microcontroller.
c) Programs based on instructions.

Unit-III: Timer, Serial port and Interrupt programming **No of Lect. – 8, Marks: 16**

a) Structure of Timer mode control register (TMOD register), Mode 1 programming.
b) Generation of large delay, Mode 2 programming
c) Counter programming, Timer control register (TCON register) structure.
d) Serial communication basics, 8051 Serial Port Programming.
e) 8051 interrupts, Interrupts Programming.

Unit-IV: Interfacing **No of Lect. – 9, Marks: 16**

a) Switch interfacing, LED interfacing, LCD interfacing,
b) ADC interfacing, DAC interfacing, Sensors interfacing,
c) Stepper motor, Relay interfacing.
d) DS12887 Real Time Clock (RTC) Interfacing
e) Serial communication protocols Inter Integrated Circuit (I^2C), Serial Peripheral Interface (SPI), MODBUS.

Unit-V: PIC microcontrollers **No of Lect. – 9, Marks: 16**

a) PIC microcontrollers overview and features, PIC 16C6X/7X, PIC 16C6X/7X ALU, CPU registers, status register, File selection register (FSR).
b) Pin Diagram, PIC reset actions, PIC oscillator connections.
c) PIC memory organization
d) PIC 16C6X/7X instructions, Addressing modes, I/O ports, interrupt in PIC 16C61/71, PIC 16C61/71 timers
e) PIC 16C61/71 ADC
f) Introduction to PIC 16F8XX Flash microcontrollers.

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

COURSE OUTLINE

Feedback Control System **FCS**

Course Title Short Title Course Code

Course Description:

This course provides an introduction to feedback control system covering: basic concept of open loop and close loop system, types of control system and their components, modeling of physical system, transfer function methods. Time response of different order system. Stability method and frequency method such as bode plot, polar plot, Nyquist criterion analysis of state variables and controllers.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Feedback Control System **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) :80 Marks**
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

Unit-I: Introduction to control system **No of Lect. – 8, Marks: 16**

a) History and development of Automatic control system.
b) Types of control system & open loop and closed loop system.
c) Transfer function of Block diagram algebra.
d) Masons gain formula and transfer function of signal flow graph.
e) Conversion of Block diagram algebra to Signal flow graph.
f) Conversion of electrical system to Signal flow graph.

Unit-II: Time response and stability of control system **No. of Lect. - 8, Marks: 16**

a) Standard test signals
b) Time response of first and second order system.
c) Steady state error and error constant.
d) Design specifications of second order system.
e) Transient response & its specifications.
f) The concept of stability & Necessary condition of stability
g) Hurwitz stability criterion.
h) Routh stability criterion, Relative stability analysis.

Unit-III: The concepts of Root locus **No of Lect. – 8, Marks: 16**

a) General rule to draw root locus.
b) Construction of root locus.
c) Root counter.
d) Effect of addition of open loop poles.
e) Effect of addition of open loops zeros.
f) Design of lead and lag compensator using root locus.

Unit-IV: Frequency domain analysis **No of Lect. – 8, Marks: 16**

a) Correlation between Time and frequency response.
b) Basics of Magnitude and phase plot.
c) Construction of bode plot.
d) Concept of lead and lag compensator using bode plot.
e) Polar plot.
f) Nyquist stability criterion.
g) Assesment of Relative stability using Nyquist criterion.

Unit-V: state space analysis and controllers. **No of Lect. – 8, Marks: 16**

a) Concept of state (State variable and state model).
b) State model of linear system.
c) Solution of state equation
d) Controllability and observability.
e) Introduction to controller PI, PD and PID.
f) Stepper motor. Servo motor and synchronous motor.

Reference Books:

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

Electromagnetic Engineering

COURSE OUTLINE

Electromagnetic Engineering **EME**

Course Title Short Title Course Code

Course Description:

This course covers the Basics of Electric field & Magnetic field, properties of conductor, properties of dielectric material & concept of capacitor with various structures. Electromagnetic waves as a UPW, Maxwell's equation in static, time varying & free space. This course deals with basics of antenna & parameters.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**03**	**14**	**42**	**03**

Prerequisite Course(s): Knowledge of Mathematics at FE and SE level.

COURSE CONTENT

Electromagnetic Engineering **Semester-V**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) :20 Marks

UNIT-I **No. of Lect. – 8, Marks: 16**

Coulomb's law and electric field intensity: –

a) Review of vector Analysis and coordinate systems.
b) Coulomb's force law & Numerical based on force law.
c) Concept of electric field intensity.
d) Volume charge density, surface charge density, Line charge density
e) Electric field due to point charge, line charge, surface charge, Volume charge. Numerical based on different configuration of charges.
f) Concept of Electric Flux. Relation between flux density & electric field intensity.

UNIT-II **No. of Lect. – 8, Marks: 16**

Gauss's law, Energy and Potential:-

a) Gauss's law, Application of Gauss's law to symmetrical charge distribution.
b) Divergence Theorem.(Statement & Proof)

c) Maxwell's first equation in electrostatics.
d) Work Done, Concept of Potential & Potential Difference.
e) Potential difference in field of point, Line, Surface, Volume charge.
f) Potential gradient, Relation between Potential gradient & Electric filed intensity.
g) Dipole and its electric field, Dipole movement.
h) Energy density in electrostatic field.

UNIT-III **No. of Lect. – 9, Marks: 16**

Conductor, Dielectrics and Capacitance:-

a) Current and current density. Current continuity equation.
b) Properties of conductors.
c) The nature of Dielectric materials.
d) Boundary Condition for perfect Dielectric materials, free space, conductor.
e) Capacitance, Parallel plate capacitor.
f) Calculation of capacitance of various configurations.
g) Poisson's and Laplace's equations.

UNIT-IV **No. of Lect. – 8, Marks: 16**

Magneto statics:-

a) Biot-Savarts law and its vector form.
b) Magnetic field due to finite, infinitely and circular loop long current carrying conductor.
c) Ampere's Circuital law, Point form of Ampere's circuital Law/Curl operator.
d) Stokes theorem.
e) Magnetic flux & Magnetic flux density.
f) Scalar and Vector magnetic potential.
g) Lorentz's Force equation. Energy stored in magnetic field.

UNIT-V **No. of Lect. – 8, Marks: 16**

Time Varying Fields & Uniform Plane Waves:-

a) Maxwell's equations (Differential, Integral and Phasor forms) for time varying, Static & free space.
b) Uniform plane waves, Transformation of UPW from time varying form into Phasor, Vice versa.
c) Representation of wave motion in free space. (Wave equations).
d) Representation of wave motion in perfect dielectrics and Lossy dielectrics.
e) Poynting's theorem & Wave power.
f) Propagation in good conductor and Skin effect.
g) Introduction to antenna basic parameter-Patterns, Beam area, radiation intensity, Beam efficiency, directivity & gain, antenna aperture, Effective height.

Reference Books:

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

Electronic Circuit Design Lab

LAB COURSE OUTLINE

Electronic Circuit Design Lab **ECD LAB**

Course Title Short Title Course Code

Course Description:

In this laboratory course emphasis is on the hand on design practice and implementation and testing of various circuits (discrete and IC based) in laboratory.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	15	30	1

Total Semester Credits: 1

Prerequisite Course(s): A background in basic electronics and circuit theory.

LAB COURSE CONTENT

(Note: Minimum five experiments to be perform)

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 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]

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 resis.
   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]

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.

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.

OR

4. **Design and test Schmitt trigger using BJT.**

    a. Selection of transistor and external components for given UTP and LTP.
    b. Calculation and verification of desired UTP and LTP

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]

All experiments (except Expt No 5), must perform 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.

Feedback Control System Lab

LAB COURSE OUTLINE

Feedback Control System Lab **FCS LAB**

Course Title Short Title Course Code

Course Description:

In this laboratory course student will be familiar with electrical network, motor and lead and lag controller. Also simultaneously student will be familiar about how to find out the Bode, polar & Nyquist plot with the help of MATLAB.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	15	30	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Basic Electronics

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1) To Plot the magnitude & phase plot of lead electrical network.
2) To Plot the magnitude & phase plot of lag electrical network.
3) To determine the transient response of RLC electrical network
4) Study of flow control using PID controller.
5) Study of synchronous to observe angular displacement.
6) Study of stepper motor.

Group B

1) Obtain the unit step response of a second order system

a) Zeta= 0.5 and ω_n= 6 rad/sec.
$(S^2+9s+19)/ (s^3+7S^2+14S+8)$

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)

3) Sketch the Bode plot for the transfer function (Unity f/b system)

a) G(s) = 1000/s(1+0.1s)(1+0.001s)

b) $G(s)= 10/s(s+1)(s+2)$

4) Sketch the Nyquist plot for the system

a) $G(s)\,H(s) = 60/(s+1)(s+2)(s+5)$

b) $G(s)H(s) = 1/(s^2+0.8s+1)$

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?

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°

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.

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.

Communication System-II Lab

LAB COURSE OUTLINE

Communication System-II Lab **CS-II LAB**

Course Title Short Title Course Code

Course Description:

This laboratory course is an introduction to the most common techniques that are used to build both analog and digital communication systems using a modern digital signal processing approach. Communication systems are introduced by looking first at baseband transmission methods such as pulse amplitude modulation (PAM) signaling, and pulse code modulation (PCM). The combination of AM, FM, PM and PAM or PCM finally leads to the most commonly used digital modulation systems such as frequency shift keying (FSK), phase shift keying (PSK) and more general 2-dimensional signal constellations using quadrature amplitude modulation (QAM). In the majority of cases the goal of a communication system is to transmit information reliably as fast as possible within a given channel bandwidth and power constraint.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Communication System-I.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **To generate and detect PCM signal.**

    a. Draw input and output waveform.
    b. From sampled output measure quantization level.
    c. Reconstruct PCM waveform from modulated signal.

2. **To understand waveform of Delta Modulation and Demodulation.**

    a. Observation of effect of slope overload.
    b. Observation of Granular noise and SNR.

3. **To understand waveform of Adaptive Delta Modulation and Demodulation.**

    a. Observation of decreasing effect of slope overload.
    b. Observation of Granular noise and SNR.

4. **To generation and detection of FSK input and output waveform.**

    a. Find the FSK frequency when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

5. **To generation and detection of PSK input and output waveform.**

    a. Find the PSK phase changing when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

6. **To generation and detection of ASK input and output waveform.**

    a. Find the ASK measure amplitude when applied logic '1' and '0'.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

Group B

7. **To generation and detection of QPSK/QAM input and output waveform.**

    a. Observed the OPSK/QAM input and output waveform.
    b. Reconstruct same signal at receiving side.
    c. Draw detected input and output waveform on graph.

8. **To Study different line codes (NRZ, RZ, polar RZ, bipolar(AMI),Manchester)**

    a. Describe representation of each code.
    b. Compare each code and made observation.
    c. Draw given input and output waveform on graph.

9. Noise analysis using any software tool (use of any discrete distribution).Find response by changing parameters. (use any open source software)

10. Noise analysis using any software tool (use of any continuous distribution).Find response by changing parameters. (use any open source software)

11. Execute Shannon Fannon algorithm by using any software tool. .(use any open source software)

12. Execute Huffman coding by using any software tool. (use any open source software)

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.

Microcontrollers & Peripheral Interface Controller Lab

COURSE OUTLINE

Microcontrollers & PIC	**MC&PIC LAB**	
Course Title	Short Title	Course Code

Course Description:

In this laboratory course emphasis is on the understanding the instruction set of 8051 microcontroller and PIC. It provides comprehensive treatment of 8051 microcontroller along with technical knowhow about PIC family. The students can use this knowledge to analyze and build the embedded system for different applications.

	Hours per Week	**No. of Weeks**	**Total Hours**	**Semester Credits**
Laboratory	**2**	**14**	**28**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Course on 8085 Microprocessor and Digital Electronics.

LAB COURSE CONTENT

(Note: Minimum SIX Experiments from group A and TWO experiments from group B.)

Group A

1. Study of 8051 / 8085 assembler and Simulator by writing program for addition and Subtraction.
2. Write and Execute program for multiplication and division.
3. Write and Execute program for Calculation of factorial.
4. Write and Execute program to flash LED.
5. Write and Execute program to interface a switch.
6. Write and Execute program to display 0 to 9 continuously on 7-Segment display.
7. Write and Execute program to demonstrate interfacing of Relay.
8. Write and Execute program to demonstrate interfacing of DAC.
9. Write and Execute program to demonstrate interfacing of ADC.

Group B

10. Write and Execute program to demonstrate interfacing of Stepper Motor.
11. Write and Execute program to demonstrate interfacing of LCD.

12. Two experiments based On PIC 16C6X/7X.
13. Two Experiments to understand the working of serial protocols.

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.

Computer Programming-III Lab

COURSE OUTLINE

Computer Programming-III Lab **CP-III Lab**

Course Title Short Title Course Code

Course Description:

This course provides an introduction to computer programming Language MATLAB/Scilab covering: Introduction to MATLAB/Scilab; Handling Arrays and Matrices; Programming in MATLAB/Scilab, M-File Scripts; MATLAB/Scilab Functions and Two-Dimensional Plots; Graphical User Interface and Applications of MATLAB/Scilab.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	**01**	**14**	**14**	**02**
Lab	**02**	**14**	**28**	

Prerequisite Course(s): Knowledge of C Language and logical reasoning.

THEORY COURSE CONTENT

Computer Programming-III Lab **Semester-V**

Teaching Scheme
Lecture: 1 hours / week

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

Unit-I: Introduction to MATLAB/Scilab **No of Lect. – 2**

a) Getting Started with MATLAB/Scilab. Command Window, Editor Window, Figure Window, Help Window, Command History Window, Current Directory Window, Workspace Window.
b) Data Types in MATLAB/Scilab, Variables, Keywords, Assignment Statement, MATLAB/Scilab System Variables, Semicolon, and Percentage Sign.
c) Commonly Used System MATLAB/Scilab Commands.

Unit-II: Handling of Arrays and Matrices **No of Lect. – 4**

a) Creating an Array, Accessing Elements of an Array, Regular Arrays, Expanding and Reducing an Array, the Length and Size functions.
b) Array Sorting, Mathematical Operations on Arrays (Addition, Substraction, Multiplication by Scalar, and Multiplication of two arrays).

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.
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.
g) Mathematical Operations on Matrices.

Unit-III: Programming in MATLAB/Scilab, M-FILE Scripts **No of Lect. – 4**

a) String Operations, String MATLAB/Scilab Functions, Time and Date Functions.
b) Introduction to M-file scripts, Creating, Saving and Running an M-file.
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.
e) The Loop Control Statements, for loop, while loop.
f) Break, continue and return statement.

Unit-IV: MATLAB/Scilab Functions and Two-Dimensional Plots **No of Lect. – 3**

a) Creating MATLAB/Scilab function file, local and global variable, saving and using function file, Inline functions, Comparison between script files and function files.
b) The plot Command, fplot command, Plotting Multiple Graphs in the same plot.
c) Formatting a plot, plot with Logarithmic axis, histograms, and polar plots.
d) Plotting multiple plots on the same page, Examples of MATLAB/Scilab Applications on plots.

Unit-V: Graphical User Interface and Applications of MATLAB/Scilab **No of Lect. – 3**

a) Introduction to GUI, GUI Development Environment, Creating a Simple GUI.
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.
d) Application: Linear Algebra, Curve Fitting and Interpolation, Numerical Integration, Digital Image Processing, etc.

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, 2010
3) Amos Gilat, "MATLAB An Introduction with Applications", Wiley India, 1st Edition, 2010
4) Rudra Pratap, " Getting Started with MATLAB 7", OXFORD, 1st Indian Edition, 2006
5) www.scilab.org

LAB COURSE CONTENT

(NOTE: minimum 6 practical from group A and 2 practicals from group B)

GROUP A (MATLAB/Scilab)

1. **Study of creation of arrays.**
   a. Create a row vector that has different elements
   b. Create a column vector that has different elements
   c. Create a matrix for given elements.

2. **Study of various operations on matrices**
   a. Create two matrices
   b. Perform arithmetic operations like addition, subtraction, multiplication & division on any two matrices
   c. Prove addition of matrices is commutative and associative
   d. Show matrix multiplication is distributive

3. **To plot sinusoidal, triangular and square signal**
   a. Plot all signals in a given range on same figure with suitable naming.

4. **Compute sampling of continuous time signal.**
   a. Plot continuous time signal
   b. Plot signals for different conditions of sampling and verify sampling theorem
   c. All signals plot on one figure.

5. **To find the pole zero plot of the given network.**
   a. Obtain Transfer function
   b. Calculate poles & zeros of given system
   c. Plot the Plot -Zero plot for given function.

6. **To find the Polar /Nyquist plot of the given network.**
   a. Obtain transfer function
   b. Plot Polar/Nyquist plot for given system

7. **Modeling of any one differential equation**
   a. Select any one differential equation and implement it with the help of simulation

GROUP B (MATLAB/Scilab)

Applications of MATLAB/ Scilab to Electronics Engineering subjects (4 Practicals)

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

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.

Industrial Training / EDP / Special Study

COURSE CONTENT

Industrial Training / EDP / Special Study	**IT/EDP/SS**	
Course Title	Short Title	Course Code

Semester-V
Total Semester Credits: 02

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

Industrial Training

- Student shall undergo industrial training for a minimum period of **two weeks** during summer vacations between fourth semester and fifth semester.
- The industry in which industrial training is taken should be a medium or large scale industry
- The paper bound report on training must be submitted by the student in the beginning of Fifth semester along with a certificate from the company where the student took training.
- Every student should write the report separately.
- Institute / Department/T&P Cell have to assist the students for finding Industries for the training.
- Students must take prior permission from Department before joining for Industrial Training.

OR

EDP (Entrepreneurship Development Program)

- Student has to participate in Entrepreneurship Development Program for a minimum period of **One week** during summer vacations between fourth semester and fifth semester.
- Every student must submit the paper bound report based on the program in the beginning of Fifth semester along with a certificate (Course / Program completion) from the program organizers.
- Every student should write the report separately.
- Institute / Department may arrange Entrepreneurship Development Program at their campus.
- Students must take prior permission from Department before attending any Entrepreneurship Development Program.

OR

Special Study

- Student has to submit name of three topics of his interest to the department.
- Special study in a group shall not be allowed.
- The three-member committee appointed by Head of Department shall allot one topic out of the three topics submitted by the student.
- Every student must submit the paper bound report based on special study at the end of Firth semester.

- Department should allot guide to all such students, for monitoring their progress and guide them for literature survey / report writing etc.
- Evaluation of special study shall be done based on presentation made by student, followed by brief question answer session.

Evaluation of Industrial Training / EDP / Special Study

ICA: The Internal Continuous Assessment shall be based on the active participation of the students in the training / EDP / Special study and based on knowledge / skill acquired by the student. The three-member committee appointed by Head of Department shall assess the reports and award marks based on following:

(a) Report	10 marks.
(b) Presentation	10 marks.
(c) Viva-voce at the time of presentation	05 marks.
Total:	**25 marks.**

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 2014 – 2015

Industrial Economics & Telecom Regulation

COURSE OUTLINE

Industrial Economics & Telecom Regulation **IETR**
Course Title Short Title Course Code

Course Description:

This course includes material from courses in economics, business, and public policy at the graduate level. Additionally, this course has been supplemented with material from investigations and consulting studies at the international level. A wide spectrum of material has been selected, with the purpose of introducing the participants to the important changes that are happening in the telecommunications industry, and the techniques usually used for cost estimations, prices, rates and other elements related to the regulation of telecommunications industry.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): General understanding of economics and management.

COURSE CONTENT

Industrial Economics & Telecom Regulation **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) :80 Marks**
Paper Duration (ESE) :03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Basic concepts in economics **No of Lect. – 9, Marks: 16**

Demand, supply, elasticity of demand and supply, competition, monopoly, oligopoly, monopolistic competition, causes creating categories of monopoly organization, price determination under perfect competition and monopoly, price discrimination, equilibrium of firm under competition and monopoly. Functions of money, supply and demand for money, money price level and inflation, black money, consequences, Meaning, magnitude.

Unit-II: Banking and Taxation system of Country. **No of Lect. –9, Marks: 16**

Function of commercial banks, multiple credit creation, banking system in India, shortcomings and improvement. Central banking: Function of central banking illustrated with reference to RBI,

monitory policy meaning, objectives and features. Sources of public revenue: principles of taxation, direct and indirect taxes, distribution of incidence, tax structure, reform of tax system.

Unit-III: **No of Lect. – 9, Marks: 16**

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.
Basic concept of management- Planning, organization, communication, Leadership & motivation.
Marketing management and marketing Mix-Product, Place, price and promotion

Unit-IV: Telecommunications Regulation. **No of Lect. – 9, Marks: 16**

-The Task of Regulation, Markets and market failure, The rules of regulation.
-The Framework for Regulation, Legal frameworks, Instruments of regulation, Enforcement, Dangers of regulation and operational aspects.
-Regulatory Strategy and Price Controls, Market strategies/ structures, Engineering and technology.
-Regulation and the Future (John Buckley, Telecommunications Regulation)

Unit-V: **No of Lect. – 9, Marks: 16**

National Telecom Policy 1994,New Telecom Policy 1999, Guidelines For Up linking From India, Broadband Policy 2004, Guidelines For Obtaining License For Providing Direct-To-Home(DTH) Broadcasting Service In India. 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)

Reference Books:

1) R Jayaram, Namita R Kotwani, "Industrial Economics and Telecommunication Regulations", PHI
2) John Buckley, Telecommunications Regulation, 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

COURSE OUTLINE

Power Electronics — Course Title
PE — Short Title
Course Code

Course Description:

This course includes power semiconductor-based devices such as SCR, IGBT and related applications. This course is designed to introduce to the students to the basic principles and applications of power semiconductor devices. It includes fundamentals, operation & characteristics of the power devices. This course provides instruction in the theory and application of power devices in the electronics and electrical industry. Emphasis is placed on the physical characteristics and uses of power devices.

Lecture	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
	03	14	42	03

Prerequisite Course(s): A background in basic electronics and circuit theory.

COURSE CONTENT

Power Electronics — **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Introduction to Power Devices — **No of Lect. – 9, Marks: 16**

a) **Silicon Controlled Rectifier (SCR):** Structure, symbolic representation, working principle, two transistor Analogy of SCR, characteristics (Static and Dynamic), Turn-ON methods, Gate triggering circuits of SCR (R,RC,UJT).
b) **Commutation Methods:** Class A, B, C, D, E, F commutation (Circuit diagram, working principle and waveforms)
c) **Protection circuits of SCR:** di/dt and dv/dt protection and Snubber circuit
d) **IGBT, GTO, DIAC, TRIAC:** Structure, symbolic representation, Working principle, characteristics.

Unit-II: Line Frequency Controlled Converters / Rectifiers No of Lect. – 9, Marks: 16

a) **Single phase Half Controlled Bridge Rectifier (R & RL Load)-** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
b) **Single phase Full Controlled Bridge Rectifier (R&RL Load) -** Circuit diagram, waveforms, average load voltage, RMS load voltage, average load power, active power, reactive power, current distortion factor, displacement factor, input power factor, efficiency, Ripple factor, Form factor.
c) **Three phase half and full controlled converter (R & RL load)** - Circuit diagram, waveforms, average load voltage, RMS load voltage, Average load current, Operating Modes.
d) **Effect of Source Inductance:** 1-Phase and 3-Phase Fully controlled Rectifier

Unit-III: DC – DC Converter No of Lect. – 7, Marks: 16

a) Classification of Choppers, Control strategies of dc - dc- converter
b) **Step down and Step up dc-dc converter**- Circuit diagram, waveform, and output voltage calculations. Continuous conduction mode, Boundary between continuous and discontinuous conduction Mode and Discontinuous Conduction Mode.
c) **Full Bridge dc-dc converter**: PWM with Bipolar voltage switching (Derivation of output voltage.)
d) **Switch mode power supply**: Block diagram and explanation.

Unit-IV: Inverters No of Lect. – 8, Marks: 16

a) **Inverters:** Basic Series and Parallel inverters, construction and principle of operation,
b) **Square and PWM Bridge Inverters:** Single phase half bridge and full bridge inverters with R and R-L load, output voltage calculations. Square wave, quasi-square wave and sinusoidal PWM switching, selection of frequency modulation ratio and amplitude modulation ratio.
c) **Harmonic reduction Techniques**.
d) **Three phase Bridge inverter**: with balanced star resistive load, 120 degree and 180 degree conduction mode for line and phase voltages.

UNIT V: AC Controllers, UPS and simulation of converters No of Lect. – 9, Marks: 16

a) **AC controllers**: Principle of On-Off control or integral cycle and phase angle control**.**
b) 1-Phase Half wave and full wave AC control with R and R -L load, derivation of output Voltage.
c) UPS- 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.
d) Simulation of single phase full converter, single phase semi converter, single phase full bridge inverter, single phase AC voltage controller.

Reference Books:

1) Ned Mohan, T. M. Undeland and W. P. Robbins- Power Electronics, converters , Application, and Design, John Wiley 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-SimPowerSystem manuals.

Electronic Measurement

COURSE OUTLINE

Electronic Measurement — Course Title
EM — Short Title
Course Code

Course Description:

The main objective of this course is to introduce and expose the students to various measuring instrument, their block diagram, specifications and applications. It includes analog instruments, digital instruments, generators, analyzers, and C.R.O. & data acquisition system.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	03	14	42	04

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

COURSE CONTENT

Electronic Measurement **Semester-VI**

Teaching Scheme

Lecture: 3 hours / week

Examination Scheme

End Semester Examination(ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Analog instruments: **No of Lect. – 8, Marks: 16**

a) Q-meter.
b) True RMS responding voltmeter.
c) Vector voltmeter.
d) Vector impedance meter.
e) Bolometer -Measurement of power.
f) Field strength meter.
g) Automatic bridges.

Unit-II: Digital Instruments **No of Lect. – 8, Marks: 16**

a) Digital Frequency Meter.
b) Digital measurement of time.
c) Universal Counter , Electronic Counter.
d) Digital tachometer, Digital PH meter.
e) Phase meter, Capacitance meter.
f) Automation in digital instruments.

Unit-III: Signal Generators and Analyzers **No of Lect. – 9, Marks: 16**

a) Frequency synthesized signal generator,
b) Random noise generator,
c) Sweep generator, TV Sweep generator, Marker generator, Wobbluscope.
d) Vectroscope,
e) Optical Time-Domain Reflectometer.
f) Frequency selective wave analyzer, Heterodyne wave analyzer.
g) Harmonic distortion analyzer.
h) Spectrum analyzer and its applications.

Unit-IV: Oscilloscope **No of Lect. – 9, Marks: 16**

a) Block diagram of CRO, vertical amplifier, horizontal deflecting systems, triggered sweep and trigger pulse circuit.
b) Delay line and its types.
c) Dual beams CRO, dual trace CRO.
d) Sampling (VHF) oscilloscope, storage oscilloscope and digital read out oscilloscope.
e) Probes for CRO
f) Digital storage oscilloscope

Unit-V: Data Acquisition, Conversion and Transmission **No of Lect. – 8, Marks: 16**

a) Generalized Data Acquisition System, Objectives of DAS, single channel and multi channel DAS.
b) Data loggers.
c) Digital Transducer
d) Data transmission systems, advantages and disadvantages of digital over analog transmitter, TDM.
e) The IEEE 488 bus.
f) Testing of audio amplifier and radio receiver.

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, 2012.

Audio Video Engineering
COURSE OUTLINE

Audio Video Engineering **AVE**
Course Title Short Title Course Code

Course Description:

This course introducing the fundamentals of Television and Consumer Electronic to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in color receiver and for alignment and servicing of such receivers.

	Hours / Week	No. Of Weeks	Total Hours	Semester Credits
Lecture	03	15	45	03

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

COURSE CONTENT

Audio Video Engineering **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) :80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Methods of sound recording and reproduction No of Lect. – 9, Marks: 16

a) Introduction to Disc recording, Magnetic recording, optical recording-CD and DVD.
b) Monophony, stereophony, Hi-Fi (High Fidelity) System.
c) PA system-Basics of aquatics, Block diagram, requirement, Characteristics, its planning for various uses.
d) Introduction to satellite radio reception (word space).
e) Introduction to blue ray disc format.

Unit-II: Basic concept of Television. No of Lect. – 9, Marks: 16

a) Scanning methods, Horizontal and vertical synchronization.
b) Camera Tubes-Image Orthicon, Vidicon, Plumbicon, Saticon, Silicon Diode array.
c) Aspect ratio, Kell factor.
d) Horizontal and vertical resolution.
e) Video bandwidth, Positive and negative modulation, Composite video signal.
f) Television Transmission-VSB transmission, TV Channels, TV Standard, TV Channels bands.
g) Basic block diagram of Monochrome TV receiver.

Unit-III: Colour Television receiver **No of Lect. – 9, Marks: 16**

a) Colour fundamental, compatibility, frequency interleaving.
b) Colour mixing, color camera tube. Colour purity.
c) Picture tubes-Static and dynamic convergence.
d) Encoder and decoder and colour different signals comparison.
e) Different system concepts-PAL, SECAM, NTSC system.
f) Colour TV transmitter and receiver block diagram.

Unit-IV: Advanced TV system and techniques **No of Lect. – 9, Marks: 16**

a) Introduction to digital compression techniques.
b) Introduction to JPEG, MPEG techniques.
c) Block diagram of Digital TV-transmitter and receiver.
d) Introduction to Advanced Display, Plasma, LCD, LED, Organic LED.
e) Introduction to HDTV (high-definition TV) transmitter and receiver.

Unit-V: Advanced Broadcasting systems **No of Lect. – 9, Marks: 16**

a) Introduction to digital cable TV conditional access system (CAS).
b) DTH system, Video on demand.
c) Introduction to 3D DTV system, CCTV, digital terrestrial TV (DTV).
d) Introduction to IPTV and mobile TV.
e) Block diagram and working of FAX Machine.

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.Gulati - Monochrome and colour TV 4th edition , New Age
6) Bernard Grobb, Charles E - Basic TV and Video system, TMH (6Th Ed.)
7) Philips handbooks on audio ,video and consumer electronics application notes
8) Olson-High Quality Sound recording and reproduction

Industrial Management

COURSE OUTLINE

Industrial Management	**IM**	
Course Title	Short Title	Course Code

Course Description:

This course provides an introduction to: basics of management their organizational structures with man power development, financial management, quality management & industrial acts.

Lecture	**Hours / Week**	**No. Of Weeks**	**Total Hours**	**Semester Credits**
	03	**15**	**45**	**03**

Prerequisite Course(s): General understanding of trade and management

COURSE CONTENT

Industrial Management **Semester-VI**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE):80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

Unit-I: Basics of Managements **No of Lect. – 9, Marks: 16**

a) Introduction, definition of management,
b) Scientific management.
c) Function of management.
d) Principles of managements.
e) Level of management, managerial skill/roles.
f) Relation between administration, management and organization.

Unit-II: Organizational Structures **No of Lect. – 9, Marks: 16**

a) Principles of organization. Design of organization.
b) Forms of organization-Line, Lines and staff.
c) Types of ownerships-Partnership, proprietorship
d) Joint stock Company, private limited, Govt. ltd, public limited.
e) Cooperative organization.
f) Public sector and joint ventures.

Unit-III: Personal Management **No of Lect. – 9, Marks: 16**

a) Factors affecting man power planning.
b) Sources of recruitment. Talent acquisition.
c) Education & training methods of training workers.
d) Labor welfare, communication in Industries
e) Suggestion system, discipline in industries.
f) e-business& e-governances.

Unit-IV: Financial management **No of Lect. – 9, Marks: 16**

a) Definition & function of Financial Management
b) Capital Structure. Fixed & working capital. Role of SEBI (Securities & exchange Board of India).
c) Sources of Finance. Loans from Banks. Trade credit. Public deposits.
d) Wants, utility, Demand.
e) Supply, Elasticity of demand & Supply.

Unit-V: Quality management & Industrial Acts. **No of Lect. – 9, Marks: 16**

a) Definition of quality, quality control.
b) Process control. Total quality concepts
c) ISO 9001-2000.
d) Factories Act, industrial accidents, industrial safety.
e) Rights patents, trademarks, copy rights.

Text Book: 1) M. Mahajan: Industrial Engineering & Production Management, Dhanpat Rai& company.

Reference Books:

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

Power Electronics Lab

LAB COURSE OUTLINE

Power Electronics Lab — Course Title
PE LAB — Short Title, Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different Power semiconductor devices and their applications like controlled rectifiers, choppers, inverters and ac regulators.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering.

LAB COURSE CONTENT

(Note: Minimum TWO Experiments from each group.)

Group A

1. Study of R, RC triggering circuits of SCR to plot waveforms for various values of firing angle.
2. Study of UJT triggering circuits of SCR to plot waveforms for various values of firing angle.
3. Study and design of Class A, B, C, D, E and F commutation circuits of SCR.(Any two)

Group 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.
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.
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.

Group C

1. Study of circuit and waveforms of step-up dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
2. Study of circuit and waveforms of step-down dc –dc converter and plot output voltage v/s duty ratio and switching frequency.
3. Study of SMPS.

Group D

1. Study of Series Inverter and find efficiency.
2. Study of Parallel Inverter and find efficiency.
3. Simulation of single phase full converter, development of model, plotting the waveform on figure and FFT analysis (use MATLAB/Scilab - SimPowerSystem Software).
4. Simulation of single phase full bridge inverter, development of model, obtain frequency spectrum using powergui block (use MATLAB/Scilab - SimPowerSystem Software).

Group E

1. Study and plot V-I characteristics of Diac/Triac/GTO/IGBT(any one).
2. Study of 1- ϕ AC controller with R load and measure load voltage and plot waveforms for different firing angles.
3. Study of UPS.

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

Electronic Measurement Lab

LAB COURSE OUTLINE

Electronic Measurement Lab — Course Title

EM LAB — Short Title Course Code

Course Description:

In this laboratory course emphasis is on the understanding of different instruments front panel of Q meter, true RMS meter, Universal Counter, CRO, DSO, Data logger and Distortion factor meter etc. The students can perform different measurements using these instruments.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	2	14	28	1

Total Semester Credits: 1

Prerequisite Course(s): Knowledge of Elements of Electrical & Electronics Engineering and Component Devices and Instrumentation Technology.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Measurement of reactive and resistive components with LCR-Q meter.
2. Measurement of Vrms signal with true RMS meter / DMM.
3. Measurement of frequency and Time with the help of frequency counter.
4. Measurement of motor speed using Digital Tacho meter.
5. Measurement of various parameters with DATA logger.
6. Measurement of Phase angle with the help of Digital Phase Meter.

Group B

7. Measurement of frequency and phase shift using Lissajous pattern and testing of different components using CRO.
8. Measure and store the frequency and amplitude with the help of DSO.
9. Measurement of distortion and nature of distortion by Harmonic distortion analyzer.

10. Computerized analysis of radio receiver and measurement of power with it.
11. Analysis of test signal with the help of Spectrum analyzer.
12. Measurement of distance with OTDR meter.

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.

Audio Video Engineering Lab

LAB COURSE OUTLINE

Audio Video Engineering Lab	**AVE LAB**	
Course Title	Short Title	Course Code

Course Description:

This course introducing the fundamentals of Audio Video Engineering to undergraduate students. As the follow-up to this course, the reader is advised to the access to this course "Colour television –principal and practices" for further information on CTV principles, detailed coverage of integrated circuits used in colour receiver and for alignment and servicing of such receivers.

Laboratory	**Hours per Week**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**8**	**16**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Physics, Analog Communication, Digital Communication, Electromagnetic Engineering.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. Study of colour TV receiver.
2. Voltage and waveform analysis for colour TV.
3. Alignment and fault finding of colour TV using pattern generator (2 expts.).
4. Study of HDTV .
5. Study of digital TV.
6. Practical visit to TV transmitter/Studio.

Group B

1. Study of DTH and set of box.
2. Study of CD/DVD players.
3. Study of PA system with cordless microphone .
4. Study of audio system ,MP3 player ,satellite radio(Tone controlled).
5. Study of tape recorder.
6. Web page designing.

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.

Application Software Lab

COURSE OUTLINE

Application Software Lab Course Title | **AS LAB** Short Title | Course Code

Course Description:

This laboratory course emphasis is on the understanding of the open source Electronics Design Automation (EDA) tool like gEDA, KiCad, Ngspice and Oscad. But only Oscad is capable of doing circuit design, simulation and layout design together. Oscad is free and open source EDA tool and that can be i installed on Ubuntu 12.04 / 12.10 or windows operating system. Using Oscad student can create circuit schematic, analyze the result using simulation, and design PCB layout.

	Hours per	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Basic of analog and digital electronics.

LAB COURSE CONTENT

(Note: Minimum FOUR Experiments from each group.)

Group A

1. **Installation of Oscad on Ubuntu 12.04 /12.10 and windows.**

   a. Compare open source, free version and license version operating system.
   b. Find the steps to install Open source Oscad on Ubuntu 12.04 / 12.10 and windows operating system.

2. **Study of Architecture of Oscad.**

   a. Describe the meaning of Electronic Design Automation (EDA) tool.
   b. Describe the advantages and disadvantages of Oscad.
   c. Use of Oscad in circuit making, simulation and PCB design.

3. **Study of schematic creation, simulation and PCB design.**

   a. Describe the steps to use Oscad in schematic creation, simulation and PCB design on Ubuntu or on windows operating system.
   b. Describe the procedure of AC and DC analysis.

4. **Simulation of typical circuit using a) R C b) Diode.**

   a. Develop circuit consist of RC network.
   b. Find voltage and current at each node of circuit and compare with the theoretical calculated value.
   c. Develop circuit consist of diode. Measure voltage and current of diode.
   d. Compare simulated result with the theoretical calculated values.

5. **Simulation of typical circuit using a) Transistor b) MOSFET**

   a. Describe operation and construction simple transistor amplifier.
   b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
   c. Compare simulated result with theoretical calculated values.
   d. Describe operation and construction of simple MOSFET based circuit.
   e. Compares all simulated node voltage and current with theoretical calculated values.

Group B

6. **Simulation and PCB design of typical circuit using IC 555.**

   a. Identify the timer 555 IC pin configuration and its use.
   b. Draw the typical circuit using timer 555 IC.
   c. Find out the time when output is high using RC combination.
   d. Find out the steps to create PCB layout.

7. **Simulation and PCB design of typical circuit using Op-Amp 741 IC.**

   a. Identify the Op-Amp 741 pin configuration and its use.
   b. Draw Inverting or Non-Inverting amplifier using IC 741.
   c. Find out the output voltage and gain of Op-Amp.
   d. Compare the simulated and theoretical calculated values.
   e. Create PCB layout.

8. **Simulation and PCB design of typical circuit using 74xx series IC.**

   a. Describe various IC available in 74xx series
   b. Draw the circuit using 74xx series and verify the truth table.
   c. Create PCB layout.

9. Simulation and PCB design of typical circuit using two stage amplifiers.

a. Describe operation and construction of simple two stage transistor amplifier circuit.
b. Simulate the circuit and find I_B, I_C, I_E, and V_{CE}.
c. Find the AC analysis and compare input and output wave form.
d. Compare simulated result of I_B, I_C, I_E, and V_{CE} of each transistor with theoretical calculated values.
e. Create PCB layout.

10. Simulation and PCB design of simple DC power supply. (DC power supply circuit include transformer- rectifier-filter- regulator.)

a. Draw and describe circuit diagram of simple DC power supply.
b. Describe the use of DC power supply.
c. Measure the voltage and current at each stage of circuit.
d. Create PCB layout.
e. (**Optional**- Implement DC power supply circuit on single side copper clad PCB and compare the all node voltage and current with simulated results).

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**

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.

Minor Project

COURSE CONTENT

Minor Project	**MIP**	
Course Title	Short Title	Course Code

Semester-VI

Laboratory	**Hours per**	**No. of Weeks**	**Total Hours**	**Semester Credits**
	2	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 50 Marks

- Every student shall undertake the Minor Project in semester VI.
- Each student shall work on an approved project, a group of **05 students (maximum)** shall be allotted for the each minor project.
- Minor project may involve fabrication, design or investigation of a technical problem that may take design, experimental or analytical character or combine element of these areas. The project work shall involve sufficient work so that students get acquainted with different aspects of fabrication, design or analysis.

- Each student is required to maintain separate log book for documenting various activities of minor project.
- The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of minor project. Maximum four minor project groups shall be assigned to one teaching staff.
- Assessment of the project for award of ICA marks shall be done jointly by the guide and departmental committee as per the guidelines given in **Table-A.**
- Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy)in following format:
    - Size of report shall be of minimum 25 pages.
    - Student should preferably refer minimum five reference books / magazines/standard research papers.
    - Format of report
        - Introduction.
        - Literature survey.
        - Theory (Implementation, Methodology, Applications, Advantages, Disadvantages. etc)
        - Future scope.
        - Conclusion.

Assessment of Minor Project

Name of the Project: _____

Name of the Guide: _____

Table-A

SN	Exam Seat No	Name of Student	Project Selection	Documentation	Design /Simulation/Logic	PCB/hardware/programming	Result Verification	Presentation	Total
			5	10	10	10	10	5	50

Seminar-I

COURSE CONTENT

Seminar-I | **S-I**
Course Title | Short Title | Course Code

Semester-VI

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**2**

Examination Scheme
Internal Continuous Assessment (ICA): 25 Marks

1. For Seminar-I every student will individually study a topic assigned to him / her and submit a report and shall deliver a short lecture / Seminar on the topic during the term.
2. The three-member committee appointed by Head of the department shall be constituted for finalizing the topics of Seminar-I. Seminar shall be related state of the art topic of his choice approved by the committee.
3. Seminar topic should not be repeated and registration of the same shall be done on first come first serve basis.
4. Topic of Seminar shall be registered within a two week from commencement of VI Semester and shall be approved by the committee.
5. Maximum six seminar supervision shall be allotted to each teacher.
6. Before the end of semester, student shall deliver a seminar and submit the seminar report (paper bound copy).

7. ASSESSMENT OF SEMINAR-I

Assessment of the Seminar-I for award of ICA marks shall be done by the guide and a departmental committee jointly, as per the guidelines given in **Table- B**

Title of Seminar: _____

Name of Guide: _____

Table-B

SN	Exam Seat No	Name of Student	Topic Selection	Literature survey	Report writing	Depth of understanding	Presentation	Total
			5	5	5	5	5	25