

Department of
Electronics and Communication Engineering

Curriculum and Syllabi

Diploma Module

North Eastern Regional Institute of Science and Technology
Deemed University :: Nirjuli
Arunachal Pradesh, 791109

Electronics and Communication Engineering Diploma Module

| Year I | Semester I | L | T | P | C |
|--------------------|--|----------|----------|----------|-----------|
| PH-3101+ | Physics-III A | 4 | 0 | 2 | 5 |
| CY-3101+ | Chemistry -III | 3 | 0 | 2 | 4 |
| HS-3101+ | Communication Skills | 2 | 0 | 2 | 3 |
| MA-3101 | Engineering Mathematics-I | 3 | 1 | 0 | 4 |
| EC-3100 | Networks, Filter and Transmission lines | 3 | 0 | 2 | 4 |
| ES-3100 | Object Oriented Programming with C++ | 2 | 0 | 4 | 4 |
| EC-3101* | Basics of Electronics Telecommunication and Workshop Practice | 3 | 0 | 4 | 5 |
| EC-3102* | Basic of Radio and TV Engineering | 3 | 1 | 2 | 5 |
| CE-3151* | Engineering Graphics | 0 | 0 | 4 | 2 |
| | | | | | 24 |
| Year I | Semester II | L | T | P | C |
| ES 3200 | Environment and Ecology | 3 | 0 | 0 | 3 |
| CY-3201 | Engineering Chemistry I | 3 | 0 | 2 | 4 |
| MA-3202 | Engineering Mathematics-II | 3 | 1 | 0 | 4 |
| EC-3200 | Analog Circuits | 3 | 1 | 2 | 5 |
| EC-3201 | Digital Electronics and Circuits | 3 | 1 | 2 | 5 |
| EC-3202 | Electronic Engineering Materials | 3 | 0 | 0 | 3 |
| ME-3277* | Comprehensive Workshop –III (Audit) | 0 | 0 | 6 | 0 |
| EC-3221 (CS+EE) | Basic Electronic Circuit and Devices (for CS and EE Students) | 3 | 0 | 2 | 4 |
| | | | | | 24 |
| | * Bridge for 10+2 PCM / Bridge for 10+2 Vocational/NERIST certificate | | | | |
| Year II | Semester I | L | T | P | C |
| HS-4101 | Principles of Economics | 3 | 0 | 0 | 3 |
| EE-4121 | Electrical Engineering | 3 | 0 | 2 | 4 |
| EC-4100 | Communication Engineering | 3 | 0 | 2 | 4 |
| EC-4101 | Signal and Systems | 3 | 1 | 2 | 5 |
| EC-4102 | Microprocessor and Computer Organisation | 3 | 1 | 2 | 5 |
| EC-4103 | Electronic Instrumentation and Measurements | 3 | 1 | 2 | 5 |
| EC-4121 (CS+EE) | Electronic Circuit and Devices (for CS and EE Students) | 3 | 0 | 2 | 4 |
| | | | | | 26 |
| Year II | Semester II | L | T | P | C |
| EC-4200 | Linear Integrated Circuits | 3 | 1 | 2 | 5 |
| EC-4201 | Industrial Electronics | 3 | 0 | 2 | 4 |
| EC-4202 | Microcontroller and its applications | 3 | 0 | 2 | 4 |
| EC-4203 | Network Analysis and Synthesis | 3 | 1 | 0 | 4 |
| EC-40** | Elective | 3 | 1 | 0 | 4 |
| EC-4251 | Computer Hardware and Peripherals | 1 | 0 | 4 | 3 |
| EC-4299 | Project (Diploma) | 0 | 0 | 6 | 3 |
| ED-4288 | Extracurricular activities and discipline | 0 | 0 | 0 | 2 |
| | | | | | 29 |
| | List of Electives | L | T | P | C |
| EC 4001 | Video and Advanced TV Engineering | 3 | 1 | 0 | 4 |
| EC-4005 | Basic Satellite Communication | 3 | 1 | 0 | 4 |
| EC-4004 | Medical Electronics | 3 | 1 | 0 | 4 |
| EC-4002 | Instrumentation and Process Control | 3 | 1 | 0 | 4 |
| EC-4003 | Transducers and Signal Conditioning | 3 | 1 | 0 | 4 |

DEPARTMENT: Physics
COURSE NUMBER: PH-3101
TITLE OF COURSE: PHYSICS-III A
DESIGNATION: REQUIRED ~~ELECTIVE~~ course (For the Students of Base Module)
PRE-REQUISITES: Base Module/ ITI

| COURSE ASSESSMENT METHODS | Lecture | Tutorial | Practical | Contact Hours | Credits |
|---------------------------|---------|----------|--------------------|---------------|---------|
| | | 4 | 0 | 2 | 6 |
| Theory | | | Assignments & Quiz | 20% of 80 | |
| | | | Mid-Semester Exam | 30% of 80 | 80 |
| | | | End-Semester Exam | 50% of 80 | |
| | | | Class Work & Viva | 50% of 20 | |
| Practical | | | Practical Exam | 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** Learn the basic of thermodynamics processes, laws of thermodynamics and radiation laws and hence improve their quantitative skills for application.
- CO2** Know the laws of electrostatic and magneto-statics and learn how to apply them in different applications.
- CO3** Learn wave nature of light and theory behind interference, diffraction and polarization.
- CO4** Learn basics of nuclear physics, radioactivity, radioactive decay and nuclear reactions.
- CO5** Learn the basics of crystal structure of solids, their classification and crystal defects.

TOPICS COVERED

| Unit | Topics | Lectures |
|----------|--|----------|
| Unit I | Thermodynamic processes: reversible, irreversible processes, Carnot engine, efficiency of Carnot engine, concept of entropy, entropy and second law, black body radiation, Kirchhoff's law, Stefan's law, Planck's law of radiation, electromagnetic spectra. | 6 |
| Unit II | Flux of electric field, Gauss' law and its application for symmetric charge distributions, calculating field from potential, capacitance, energy stored in an electric field, Dielectric and Gauss' law, current density and drift speed, Ohm's law -microscopic view, Hall effect, Biot -Savart law and its application to straight current carrying conductor and circular current loop, Ampere's circuital law and its application to solenoid and toroid, energy stored in a magnetic field. | 10 |
| Unit III | Wave front, Huygens's principle, reflection and refraction of waves using Huygens's principle, coherent sources, interference of light waves and Young's double slit experiment, intensity in double slit interference, thin film interference, Newton's rings, Single slit diffraction, diffraction grating, polarization, law of Malus, polarization by reflection. | 10 |
| Unit IV | Nuclear material and their properties, nuclear force, radioactivity and decay laws, nuclear fusion, nuclear fission and nuclear reactor, nuclear power generation system, effect of nuclear wastes, nuclear radiation shielding method. | 10 |
| Unit V | Crystal structure of solids: space lattice, unit cell and Bravais's lattice, coordination number, atomic packing factor, crystal directions and planes, Miller indices, defects in crystals | 6 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Concepts of Physics, vol. I and II, H. C. Verma, Bharti Bhawan
2. Physics, R. Resnick, D. Halliday & K. S. Krane,
3. University Physics, F. M. Sears, M. W. Zemansky & H. D. Young, Norosa Publishing House
4. Material Science and Engineering, V. Raghavan, Prentice Hall of India

DEPARTMENT: Chemistry
COURSE NUMBER: CY 3101
TITLE OF COURSE: Chemistry –III
DESIGNATION: REQUIRED ~~ELECTIVE~~ course (For the Students of Base Module)
PRE-REQUISITES: Base Module/ ITI

| COURSE | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|--------|---------|----------|------------|---------------|---------|
|--------|---------|----------|------------|---------------|---------|

DETAILS:

| | 3 | 0 | 2 | 5 | 4 | |
|----------------------------------|-----------|---|--------------------|-------------------|-----------|----|
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 75 | | |
| | | | | Mid-Semester Exam | 30% of 75 | 75 |
| | | | | End-Semester Exam | 50% of 75 | |
| | Practical | | Class Work & Viva | 50% of 25 | | |
| | | | | Practical Exam | 50% of 25 | 25 |

COURSE OUTCOMES

- CO1** Apply with the knowledge of flow of energy in spontaneous and non-spontaneous processes including chemical reactions.
- CO2** Apply to the optimization of process conditions in synthesis and manufacturing with control of the stability of commercial products.
- CO3** Understand the characteristics and properties of different types of solution which significantly help to use in different purposes.
- CO4** Learn about role of homogeneous and heterogeneous catalysts and their uses in the manufacturing of various kind of substances in industries.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | First Law of Thermodynamics: Scope, importance and limitations of thermodynamics, Terminology of thermodynamics, Work and heat, Internal energy, First law of thermodynamics, Isothermal and adiabatic processes, Work done in reversible and irreversible processes-involving ideal gases, Enthalpy, Heat capacities, Cp-Cv relationship for ideal gases, Joule-Thomson coefficient-for ideal and real gases, Zeroth law of thermodynamics, concept of temperature and absolute temperature scale. | 6 |
| Unit II | Thermochemistry: Endothermic and exothermic reactions, Heat of reaction at constant volume and at constant pressure, Enthalpy of reactions, Enthalpy of combustion, Enthalpy of formation, Standard enthalpy of formation and relative enthalpies of compounds, Enthalpy of solution and dilution, Enthalpy of neutralization, Enthalpy of precipitation, Variation of enthalpy of reaction with temperature, Kirchoff's equation, Maximum flame temperature and explosion temperature, Hess's law and its applications., I;3ond energy, its calculation and applications. | 10 |
| Unit III | Second and Third Law of Thermodynamics: Second law of thermodynamics, Spontaneous and non-spontaneous processes, Entropy and its physical significance, Gibb's free energy and its physical significance, Criteria for spontaneity, Gibbs-Helmholtz equation, Standard free energy change and equilibrium constant, Clapeyron-Clausius equation and its applications. Third law of thermodynamics and its applications. | 10 |
| Unit IV | Chemical Kinetics: Rate of reaction, Factors influencing rate of reaction, Molecularity and order of reaction, Rate expressions. and examples of first and second order reactions, Determination of order of reaction, Effect of temperature on rate of reaction, Threshold energy, Activation energy and Arrhenius equation. | 4 |
| Unit V | Solutions: Types of solutions, Concentration of solution, Vapour pressure, boiling point and freezing point, Solutions of solid in liquid, liquid in liquid and gas in liquid, Solubility and solubility curve, Raoult's law, Ideal and non-ideal solutions. Henry's law. Colligative Properties of Dilute Solutions: Colligative properties of dilute solution of non- electrolytes, Relative lowering of vapour pressure, Elevation in boiling point, Depression in freezing point, Osmotic pressure, Abnormal colligative property and Van' t-Hoff factor. | 6 |
| Unit VI | Surface Chemistry and Colloidal State: Adsorption: Adsorption of gases, Factors influencing adsorption, Heat of adsorption, Physical and chemical adsorption, Freundlich adsorption isotherm, Isobar and isochoric, Adsorption from solution, Applications of adsorption. Colloidal State: Classification of colloids, Classification, preparation and properties of sols, emulsions and gels. Applications and significances of colloidal states. Catalysis: Catalysts, Catalysis, Autocatalysis, Negative catalysis and poisons, General Characteristics, Homogeneous and heterogeneous catalysis. | 6 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Pradeep's New Course Chemistry (Class-XII), S. C. Kheterpal, P. N. Kapil, S. N. Dhawan and R. S. Nandwani, Pradeep Publication, lalandhar.
2. Comprehensive Chemistry (Class-XII), N. K. Verma & S. K. Khanna, Laxmi Publication(P) Ltd, New Delhi, 2009.
3. Modern's abc Chemistry (Class-XII), S. P. lauhar and S. K. Malhotra, Modern Publishers, New Delhi.
4. Principles of Physical Chemistry, B. R. Puri, L. R. Sharma & M. S. Pathania, Vishal Publishing Co., lalandhar, 2003.
5. Physical Chemistry, 6'h Ed., P. C. Rakshit, Sarat Book House, Kolkata, 2001
6. Physical Chemistry, 5'h Ed, P. W. Atkins, Oxford University Press, ELBS Edition,

- London, 1994.
7. Physical Chemistry, W. I. Moore, Prentice Hall Inc, NY, 1990

| | | | | | |
|----------------------------------|---|----------|--------------------|---------------|---------|
| DEPARTMENT: | Humanities and Social Sciences | | | | |
| COURSE NUMBER: | HS-3101 | | | | |
| TITLE OF COURSE: | Communication Skills | | | | |
| DESIGNATION: | REQUIRED ELECTIVE course (For the Students of Base Module) | | | | |
| PRE-REQUISITES: | Base Module/ ITI | | | | |
| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
| | 2 | 0 | 2 | 4 | 3 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 66 | |
| | | | Mid-Semester Exam | 30% of 66 | 66 |
| | | | End-Semester Exam | 50% of 66 | |
| | Practical | | Class Work & Viva | 50% of 34 | |
| | | | Practical Exam | 50% of 34 | 34 |

COURSE OUTCOMES

- CO1** Independently read, understand/comprehend and discuss texts.
CO2 Be competent in English punctuation and grammar.
CO3 Show a competence in the understanding of different forms of writing viz. Prose, Poetry and Fiction, etc.
CO4 Show an understanding and the use of Figures of Speech

TOPICS COVERED

| | | |
|----------|--|----------|
| | | Lectures |
| Unit I | Introduction to Linguistics, Sociolinguistics, language Usage. | 6 |
| Unit II | Essay -I Reading/ Explanation & Essay - II: Reading/Explanation. | 10 |
| Unit III | Introduction to Poetry: Poem-Reading/Explanation & Poem II: Reading/Explanation | 10 |
| Unit IV | Introduction to Narratives and Oral Skills: Speech-Reading/Explanation and one prescribed novel for non-detailed study | 10 |
| Unit V | Rhetoric/Figures of Speech, Writing Skills, Oral Skills, ESP | 6 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Modern Linguistics: an Introduction-Verma and Krishanswamy, Oxford University Press.
2. Modern Prose: Stories, Essays and Sketches-Michel Thorpe, Oxford.
3. Writing Skills-Oliviera and Motta, Penguin.
4. Oxford Guide to Effective Writing & Speaking-John Seely, Oxford Press

| | | | | | |
|----------------------------------|--|----------|--------------------|---------------|---------|
| DEPARTMENT: | Mathematics | | | | |
| COURSE NUMBER: | MA-3101 | | | | |
| TITLE OF COURSE: | Engineering Mathematics-I | | | | |
| DESIGNATION: | REQUIRED ELECTIVE course (For the Students of Base Module and Lateral entrants after Class XII) | | | | |
| PRE-REQUISITES: | Base Module/ ITI/HS | | | | |
| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 100 | |
| | | | Mid-Semester Exam | 30% of 100 | 100 |
| | | | End-Semester Exam | 50% of 100 | |

COURSE OUTCOMES

- CO1** To understand the concept of maxima and minima for the functions of two variable

- through various applications.
- CO2** To understand the concept of solving improper integrals, double and triple integrals.
 - CO3** To understand the various concepts of vector calculus and solving the problems based on that.
 - CO4** To understand the concept of solving linear simultaneous equations and finding inverse through various methods
 - CO5** To understand infinite series and the concept of convergence and divergent of infinite series using different tests.

TOPICS COVERED

| | Lectures |
|----------|----------|
| Unit I | 12 |
| Unit II | 10 |
| Unit III | 10 |
| Unit IV | 10 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Engineering Mathematics Vol-I, S.S . Sastry, Prentice Hall of India, New Delhi, 1999.
2. Calculus and Analytic Geometry, Thomas & Finny, Narosa Publishing House, New Delhi, 1998.
3. A Text Book of matrices, Shanti Narayan, S Chand & Co., New Delhi, 1998.
4. Higher Engineering Mathematics, H.K. Dass, S Chand & Co., New Delhi, 2001. S. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & sons, NY, 1999.

DEPARTMENT: Electronics and Communication Engineering.

COURSE NUMBER: EC-3100.

TITLE OF COURSE: Networks, Filters and Transmission lines

DESIGNATION: REQUIRED / ~~ELECTIVE~~ course

PRE-REQUISITES:

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|----------|--|-------------------------------------|---------|
| | 3 | 0 | 2 | 5 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 75 30% of 75 50% of 75 | 75 |
| | Practical | | Class Work & Viva Practical Exam | 50% of 25 50% of 25 | 25 |

COURSE OUTCOMES

- CO1** Understanding networks and concept of impedance matching and its significance..
- CO2** Understanding the resonance in steady state AC circuits.
- CO3** Ability to design attenuators, equalizers and filters for given applications.
- CO4** Analyze and interpret the voltage and current distributions on the transmission lines and solve impedance matching issues.

TOPICS COVERED

| | Lectures |
|--------|----------|
| Unit I | 10 |

| | | |
|----------|--|---|
| | Networks – One port, Two port, Balanced, unbalanced, Active , Passive, T, PI, Lattice, Ladder networks, Concepts and significance of Characteristic impedance, propagation constant, attenuation constant, phase shift constant of T and PI network, Star- Delta transformation. | |
| Unit II | Series Resonance: properties of series RLC resonance circuit, bandwidth, selectivity, frequency response, Parallel Resonance : properties of parallel RLC resonance circuit, bandwidth, selectivity, frequency response. | 7 |
| Unit III | Study of various types of Attenuators and Equalizers (Qualitative treatment only)and their applications | 8 |
| Unit IV | Various types of Passive Filters, LPF, HPF, BPF, BSF, m-Derived and their applications, basic concept of active filters and their comparison with passive filters. | 8 |
| Unit V | Transmission-line Equation and solutions, Reflection and Transmission coefficients, Standing wave and Standing wave ratio. Line Impedance and Admittance. Smith chart and Single stub matching | 9 |

**TEXT BOOKS/
REFERENCES**

1. Networks, Lines and Fields, John D.Ryder. (PHI) 1st Ed.1978
2. Circuit Theory (Analysis and Synthesis), A. Chakraborty (Dhanpat Rai & Co.)3rd Ed.2010
3. Network Analysis, M.E.VanValkenburg (PHI) 2nd Ed. 2006
4. Network and Systems, D.Roy Choudhury (New Age International).1st Ed. 1998
5. Networks, Filters and Transmission lines, P.K.Jain, Gurbir Kaur.(TMH).1st Ed. 1994

DEPARTMENT: Computer Science and Engineering
COURSE NUMBER: ES 3100
TITLE OF COURSE: Object Oriented Programming with C++
DESIGNATION: ~~REQUIRED~~ ~~ELECTIVE~~ course (For the Students of Base Module and Lateral entrants after Class XII)

PRE-REQUISITES: Base Module/ ITI/HS

| | | | | | |
|----------------------------------|-----------|----------|--|-------------------------------------|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
| | 2 | 0 | 4 | 6 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 50 30% of 50 50% of 50 | 50 |
| | Practical | | Class Work & Viva Practical Exam | 50% of 50 50% of 50 | 50 |

**COURSE
OUTCOMES**

- CO1** To understand fundamentals of object oriented programming
- CO2** To define classes, object, friend function, constructors and destructor.
- CO3** To implement unary and binary operator overloading
- CO4** To understand inheritance, its types and virtual functions
- CO5** To understand pointers and implement polymorphism

TOPICS COVERED

| | | |
|----------|---|----------|
| | | Lectures |
| Unit I | Overviews of C, Procedural Vs Object Oriented Programming (OOP), characteristics of OOP, Variables, constants, operators in C++, Functions: Function Prototyping, Call by reference, Call by Value, Return by Reference, Inline Function, Constant Arguments, Function. | 3 |
| Unit II | Classes & Objects, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Object as Function Arguments, Friend Functions, friend classes, Returning Objects, Constant member functions, Pointer to members, Constructor :Parameterized Constructor, Multiple Constructor in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic constructor, Destructor and its uses | 7 |
| Unit III | Operator Overloading: Defining operator Overloading Overloading Unary, binary Operators, Overloading Binary Operator Using Friends, Manipulating of String Using Operators; Type Conversion details | 7 |
| Unit IV | Inheritance: Single, Multilevel, Hierarchical, Multiple, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes. | 4 |
| Unit V | Pointers, Pointer to Object, This pointer, Pointer to Derived Class, Virtual Function, | 7 |

Pure Virtual Function, Polymorphism implementations. Working with files, Command Line Arguments.

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. E. Balaguruswamy, "Objected Oriented Programming with C++", TMH.
2. R. Venugopal, Rajkumar, T. Ravishankar, "Mastering C++", TMH

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-3101.
TITLE OF COURSE: Principles of Electronic Telecommunication and Workshop Practice
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES:

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|----------------------------------|-----------|----------|--|-------------------------------------|---------|
| | 3 | 0 | 4 | 5 | 5 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 60 30% of 60 50% of 60 | 60 |
| | Practical | | Class Work & Viva Practical Exam | 50% of 40 50% of 40 | 40 |

COURSE OUTCOMES

- CO1** To understand the working principle of a PN junction diode.
CO2 To understand the different modes of transistor operation, transistor classifications.
CO3 Understanding electromagnetic waves, wave propagation through different medium.
CO4 Familiarization to electronic measuring instruments and IC fabrication.

TOPICS COVERED

| | | lectures |
|----------|--|----------|
| Unit I | PN Junction electronics, Intrinsic and extrinsic semiconductors, charge densities, diffusion and drift current, Depletion/Diffusion capacitance, Break down, PN junction under forward and reverse bias, V-I characteristics, current equation, Zener and its characteristics | 10 |
| Unit II | Transistors: Basic principles of operation, I/V characteristics, Modes of operation., α , β calculations. Amplifier configuration: CE, CB, CC, Biasing of Transistors, Load line and Q point. Introduction to Class A, B and C amplifier circuits. Simple calculation of Voltage/ current gain (using simplified pi model), introduction to power amplifiers, multistage amplifiers and audio amplifiers. | 10 |
| Unit III | Fundamentals of communication Engineering: Introduction to electromagnetic wave spectra, types of propagation, ground wave, space wave, sky wave, ionosphere, skip distance, radio horizons, skip zones. Introduction to communication system: telephony, telegraphy, radio and TV. | 10 |
| Unit IV | Systems of units and standards of measurement. Working principles of various electronic meters (ammeter, voltmeter, multi-meter and watt meter) and CRO. | 8 |
| Unit V | Introduction to IC: Familiarization with popular ICs. Workshop: Soldering practice, PCB making, transformer winding, Anodized plate making. | 4 |

TEXT BOOKS

1. Electronic Devices and Circuit theory, by Robert L boylestad and Louis Nashelshky. Prentice Hall 1996
2. Electronics Principles by A.P. Malvino (TMH) 2008
3. Microelectronics by J. Millman and Arvin Gabel.(TMH), 1999
4. Integrated Electronics by J. Millman and C.C Halkias.(TMH), 2001

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-3102
TITLE OF COURSE: Basic of radio and television engineering
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: EC 2100

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|------------------------|---------|----------|--------------------|---------------|---------|
| | 3 | 1 | 2 | 6 | 5 |
| COURSE | Theory | | Assignments & Quiz | 20% of 80 | 80 |

ASSESSMENT METHODS

| | | | |
|-----------|-------------------|-----------|----|
| | Mid-Semester Exam | 30% of 80 | |
| | End-Semester Exam | 50% of 80 | |
| | Class Work & Viva | 50% of 20 | |
| Practical | Practical Exam | 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** To be familiarized with the different communication systems
CO2 To understand the principle of AM signal transmission and reception.
CO3 To understand the principle of FM signal transmission and reception
CO4 To understand the working principle of TV transmitters and TV receivers.

TOPICS COVERED

| | | lectures |
|----------|---|----------|
| Unit I | Introduction to communication systems-Telephone, Radio and TV, RADAR, Satellite and Optical communication systems. | 6 |
| Unit II | AM Transmitter: Classifications. Constituent stages of AM Radio transmitter. Different types of Modulators and AM power amplifiers. Antennas and matching circuits for an AM transmitter. Privacy device in Radio Telephony, SSB transmission. Radio telegraph transmitters. Reactance tube modulators. AM Receiver: Role of a receiver, receiver requirements, TRF receiver, super heterodyne receiver, double-conversion receiver, direct conversion (homodyne) receiver. Receiver specifications, receiver sensitivity, minimum detectable signal, noise figure, selectivity, dynamic range, automatic gain control (AGC), image rejection, compression, third-order intermodulation. Selection of IF frequency, local oscillator tracking, role of filtering in RF and IF stages in super heterodyne receiver. Block diagram of commercial AM | 11 |
| Unit III | FM Transmitter: FM transmitter using reactance tube modulators, stabilization of frequency drift, Armstrong FM transmitter, Antennas and matching circuits for an FM transmitter. Transmitter power supply system. FM Receiver: Limiter, detectors, slope detector, balance slope detector, Foster-seeley discriminator, ratio detector, stereo FM multiplexing reception. | 11 |
| Unit IV | TV Transmitter: Television signal propagation and antennas. Modulation system, Duplexer, TV antennas, Signal reception, Ghost Image. Types of telecasting, Production standards NTSC, PAL, SECAM. TV Receiver: Types, Basic principle, Picture tubes, Video circuits, AGC circuits, Sync circuits, Color circuits, Automatic color circuits, Deflection oscillators, Vertical deflection circuits, Horizontal deflection circuits, The picture IF section, Cable distribution system. Colour TV receiver: Essentials of Colour television, Principle of colour TV, Colour picture tubes, Colour signal transmission and reception. Different TV types Plasma, LCD, LED, OLED. | 14 |

TEXT BOOKS

1. Monochrome and Colour Television. R.R.Gulati. (Wiley Eastern)
2. Monochrome and Colour Television. Practice by R.R.Gulati. (Wiley Eastern)
3. Basic Radio and Television . S.P.Sharma
4. Radio and TV Engineering by G. K. Mithal
5. Electronic Communication Systems. George Kennedy. (TMH).

DEPARTMENT: Civil Engineering**COURSE NUMBER:** CE 3151**TITLE OF COURSE:** Engineering Graphics**DESIGNATION:** REQUIRED ~~ELECTIVE~~ course (For the Lateral entrants after Class XII)**PRE-REQUISITES:** HS

| Lecture | Tutorial | Practical | Contact Hours | Credits |
|-----------|----------|-------------------------------------|--------------------------|---------|
| 0 | 0 | 4 | 4 | 2 |
| Practical | | Class Work & Viva Practical Exam | 50% of 100 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** Learn fundamentals of drawing different types of lines and letterings, and concepts of systems of dimensioning; Draw various engineering curves.
CO2 Learn concepts of projections and to draw projections of points, lines and planes.
CO3 Learn and draw projections of solids comprising auxiliary views and sectional views.

CO4 Learn and draw the surfaces developed of an object, develop the concept of isometric views and projections. Draw isometric views from orthographic views and orthographic views from isometric views.

TOPICS COVERED

| | | |
|----------|--|---------------|
| Unit I | 1. Lines lettering & dimensioning; Engineering curves: Conic sections, Cycloid, Involute, Spiral, Helix etc. | Lectures 6 |
| Unit II | Projection of points straight lines & planes. | 10 |
| Unit III | Projection of solids, auxiliary views, and sectional views. | 10 |
| Unit IV | Development of surfaces, and Isometric drawings/views. | 16 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. Elementary Engineering Drawing, N.D. Bhatt and M. Panchal, Charotar Publishing House, Anand, 2000.
2. Engineering Drawing, Venugopal, Wiley Eastern Ltd, New Delhi, 1992.
3. Engineering Drawing & Graphic Technology, FrenchT.E., Vierck C.J. & Forester R.J., McGraw Hill International, Singapore, 1993.

DEPARTMENT: Civil Engineering and Forestry
COURSE NUMBER: ES-3200
TITLE OF COURSE: Environment and Ecology

DESIGNATION: ~~REQUIRED~~ **ELECTIVE** course
PRE-REQUISITES: For the Students who completed a semester

| | | | | | |
|----------------------------------|---------|----------|--|--|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
| | 3 | 0 | 0 | 3 | 3 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 100 30% of 100 50% of 100 | 80 |

**COURSE
OUTCOMES**

- CO1** To understand the basic concept of Environment and Ecology.
CO2 To learn about environmental impact of human activities.
CO3 To learn about natural resources.
CO4 To get knowledge about environmental pollution.
CO5 To get the knowledge about current environmental issues
CO6 To learn about environmental protection

TOPICS COVERED

| | | |
|----------|--|---------------|
| Unit I | Basic Concept of Environment and Ecology: Introduction, types of environment, components of environment, environmental studies, need for public awareness, Introduction to ecosystem, classification of ecosystem, structure of ecosystems, functioning of ecosystems, balance of ecosystems | Lectures 6 |
| Unit II | Environmental Impact of Human Activities: Impact of industrialization, modern agriculture, housing, mining, and transportation on environment. | 10 |
| Unit III | Natural Resources: Classification of natural resources, water resources, mineral resources, forest resources, material cycles, energy resources, electromagnetic radiation. | 10 |
| Unit IV | Environmental Pollution: Types of environmental pollution, water pollution, waterborne diseases, land pollution, noise pollution, air pollution, automobile pollution, effects of environmental pollution, public health aspects, solid waste management | 4 |
| Unit V | Current Environmental Issues: Population growth, global warming, climate change, urbanization, acid rain, ozone layer depletion, animal husbandry. | 6 |
| Unit VI | Environmental Protection: Role of Government, Legal aspects, initiatives by NGOs, environmental education, women's education | 6 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. Concepts of Physics, vol. I and II, H. C. Verma, Bharti Bhawan
2. Physics, R. Resnick, D. Halliday & K. S. Krane,
3. University Physics, F. M. Sears, M. W. Zemansky & H. D. Young, Norosa Publishing House
4. Material Science and Engineering, V. Raghavan, Prentice Hall of India

DEPARTMENT: Chemistry
COURSE NUMBER: CY-3201
TITLE OF COURSE: Engineering Chemistry I
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: CY3101 for ITI students or Class 11/12 Chemistry for NEE II students

| COURSE ASSESSMENT METHODS | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|---------------------------|-----------|----------------|--------------------|---------------|---------|
| | | 3 | 0 | 2 | 5 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 75 | 75 |
| | | | Mid-Semester Exam | 30% of 75 | |
| | Practical | | End-Semester Exam | 50% of 75 | 25 |
| | | | Class Work & Viva | 50% of 25 | |
| | | Practical Exam | 50% of 25 | | |

COURSE OUTCOMES

- CO1** Gain knowledge of the metallurgy of aluminum, copper, germanium, silicon and phosphorus, and use these elements for engineering use in making their alloys.
- CO2** Apply the principles of corrosion to use techniques for prevention of corrosion of metals.
- CO3** Understand the characteristic properties of polymer materials to prepare them and use them for household and industrial purposes.
- CO4** Decipher the hardness causing inorganic materials from hard water to make de-ionized water and potable water.
- CO5** Gain the knowledge of the composition and properties of glass, cement and liquid crystals, and make use of these engineering materials.

TOPICS COVERED

| TOPICS COVERED | Lectures |
|---|----------|
| Unit I Metals and Alloys: Important ores of copper and aluminium, their extraction and uses. Chemistry of Silicon, Germanium and Phosphorous with reference to their compounds and reactions. Definition, classification and significance of alloys. Composition and uses of Brasses, Bronzes, Nichrome, Duralium, Solders, Alnico and Stainless steel | 6 |
| Unit II Corrosion and its prevention: Definition; Theories of corrosion (Dry and wet) and their mechanism. Factors affecting the rate of corrosion. Prevention of corrosion | 10 |
| Unit III Polymers and polymerization: definition; classification of polymers; functionality. Types of polymerization (addition and condensation). Preparation, properties and uses of addition polymers like PE, PP, PVC, PS, PVA, PMMA, PTFE, PAN and condensation polymers like polyamides, polyesters, phenoplasts, aminoplasts. Mechanisms of different types of addition polymerization. Natural and synthetic rubbers; vulcanization and its importance. Structure and technological. | 10 |
| Unit IV Water treatment: Boiler Feed water-Hardness, its units and determination; scale and sludge formation, boiler corrosion, caustic embrittlement; priming, foaming and their prevention. conditioning, internal treatment using; carbonate, phosphate and calgon conditionmg; and external treat- ment using soda-lime, zeolite and ion exchange process. Municipal water, Water treatment (purification, coagulatipn, filtration and disinfection) for municipal supply. | 7 |
| Unit V Engineering materials: Cement treatment and its classification; Portland cement-manufacture, chemical composition, setting and hardening, 1ST specifications, physical properties and decay. Glass: Manufacture of glass; types of glasses and their uses. Liquid crystals: Introduction, classification, chemical constitution, liquid crystalline behaviour in homologous series, molecular ordering in different mesophases, applications. | 9 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. A Text Book of Engineering Chemistry, Shashi Caw la, Dhanpat Rai and Co. Pvt. Ltd., Delhi.
2. A Text book of Engineering Chemistry, S. S. Dara, S. Chand & Company Ltd., New Delhi. 3.Engineering Chemistry, B. Sivashankar, Tata McGraw-Hill Publishing company Limited, New Delhi.
3. Engineering Chemistry, P.c. Jain and Monica Jain, Dhanpat Rai and Co. Pvt. Ltd., Delhi.
4. Polymer Science, VR.Gowarikar, N.VWishwanathan & J. Sreedhar, Wiley-Eastern Ltd; New Delhi

DEPARTMENT: Mathematics
COURSE NUMBER: MA 3202
TITLE OF COURSE: Engineering Mathematics-II
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: MA 3101

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|----------------------------------|---------|----------|--|--|---------|
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 100 30% of 100 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** To understand the concept linear ordinary differential equation of second order and the differential equation of first order but not of first degree through various applications
- CO2** To understand the concept partial differential equations with applications.
- CO3** To understand the concepts Laplace transforms and its inverse with applications.
- CO4** To understand the concept of probability theory and understand various discrete and continuous probability distributions with applications

TOPICS COVERED

| TOPICS COVERED | Lectures |
|---|----------|
| Unit I Linear ordinary differential equation of order two with constant coefficients and variable coefficients, Complementary function and particular integrals, Variation of parameter method, Method of undetermined coefficients, Differential Equation of first order but not of first degree. | 6 |
| Unit II Partial differential equation, Linear partial differential equation, Lagrange's Method. | 10 |
| Unit III Fourier series, Even and odd functions, half range Fourier series, Fourier series for functions having arbitrary period, Fourier integral, Fourier Transform | 10 |
| Unit IV Measure of central tendency and dispersion: Mean, median, mode, fractiles, Range, Quartile deviation, Mean deviation, Standard Deviation, Coefficient of variation; Moments, Skewness and Kurtosis. r Probability: Various approaches of probability, Classical frequency, Statistical, Subjective, and axiomatic theorems on probability, conditional probability, Multiplication theorem, Independent events, Baye's theorem. Random Variables: Discrete and Continuous, Probability mass function and probability density function, Probability distribution, Repeated Poisson and Normal distributions. | 16 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Engineering Mathematics Vol-I, S.S. Sastry, Prentice Hall of India, New Delhi, 1999.
2. Calculus and Analytic Geometry, Thomas & Finny, Narosa Publishing House, New Delhi, 1998.
3. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & sons, NY, 1999.
4. Higher Engineering Mathematics, H.K. Dass, S Chand & Co., New Delhi, 2001: Fundamental of Statistics Vol I by Goon, Gupta and Das Gupta.

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-3200.
TITLE OF COURSE: Analog circuits.
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: EC2100, 3102*

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|----------|--|-------------------------------------|---------|
| | 3 | 1 | 2 | 6 | 5 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 80 30% of 80 50% of 80 | 80 |
| | Practical | | Class Work & Viva Practical Exam | 50% of 20 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** To understand the basics of semiconductor physics.
- CO2** To learn about Transistor operations, FETs and MOSFETs various modes of operation and its frequency response.
- CO3** Introduction to power amplifiers and its types.
- CO4** To learn about multistage amplifiers and tuned amplifiers and the need for such circuits.

TOPICS COVERED

| | | lectures |
|----------|--|-----------------|
| Unit I | BJT: Operation and Structure, Transistor Models and Characteristics, Operation in Saturation. BJT Configurations, biasing techniques. Low frequencies, High frequency models for BJT, BJT Amplifiers, h-parameters. Hybrid model for transistor amplifiers. Amplifier performance parameters in terms of h-parameters; r-parameters. | 12 |
| Unit II | FET and MOSFET: Operation and Structure, Device Models. Junction field effect transistor (JFET), MOSFET types, biasing, Small signal parameters. Common Drain, Common source and common gate amplifiers. Small signal analysis. FET as constant current source. MOS Capacitor, CMOS Circuits. | 10 |
| Unit III | Power Amplifiers: Analysis and design of class A, B, AB, C amplifiers and distortion and efficiency calculations. Push pull amplifiers. | 10 |
| Unit IV | Multistage amplifier: Need, Gain expression, types - RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth. Tuned Amplifiers: Need for tuned circuits, Single Tuned Amplifiers, Double tuned, Synchronously tuned amplifiers. | 10 |

TEXT BOOKS

1. Fundamentals of Microelectronics, Behzad Razavi, John Wiley & Sons, 1st Ed. 2009
2. Electronic Devices and Circuits, Fourth Edition by David A. Bell. (PHI).1st Ed. 1999
3. Electronics Principles By: A. P. Malvino, TMH. 2nd Ed. 2008
4. Microelectronic by Adel S. Sedra and C Smith, Oxford university press.4th Ed. 1998
5. Integrated Electronic circuits By: J. Millman and C.C. Halkias, 4th Ed. TMH.2001
6. Pulse Digital and Switching Waveforms by Taub and Shilling, 5th Ed. TMH.2011
7. Electronics Circuits By: D. Shilling, 3rd Ed. Tata McGraw 2002

DEPARTMENT: Electronics and Communication Engineering.

COURSE NUMBER: EC-3201.

TITLE OF COURSE: Digital Electronics and Circuit.

DESIGNATION: REQUIRED ~~ELECTIVE~~ course

PRE-REQUISITES:

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|--|-----------|-------------------------------------|---------|
| | 3 | 1 | 2 | 6 | 5 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz Mid-Semester Exam End-Semester Exam | | 20% of 80 30% of 80 50% of 80 | 80 |
| | Practical | Class Work & Viva Practical Exam | | 50% of 20 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** Acquire knowledge about basics of digital electronics, number systems and Boolean algebra.
- CO2** Analyze and design digital combinational circuits for SSI, LSI and MSI circuits
- CO3** Understand the operation of different types of logic families
- CO4** Analyze and design of sequential digital circuits.

TOPICS

Lectures

COVERED

| | | |
|----------|--|----|
| Unit I | Number System and Boolean Algebra: Binary Numbers. Hexadecimal number, binary addition, subtraction, r's complement & (r-1)'s complement, binary multiplication and Division. Codes and their conversions: BCD, Octal, Hexadecimal, ASCII, Gray, Signed binary number representation with 1's and 2's complement method. Boolean Algebra: Boolean identities, De Morgan's theorems. SOP, POS. Concepts of min term and max terms. AND-OR networks. Algebraic Simplification. Karnaugh Map , MEV technique and Quine-McClusky method | 10 |
| Unit II | Combinational Circuit: Basic logic gates and universal Gate. Design of Combinational logic circuit. Half Adder, Full adder, Ripple Carry adder, the carry look-ahead adders. Half-Subtractor, Full Subtractor, code converter, decoder, multiplexer, de-multiplexer parity generator and checker. | 10 |
| Unit III | Logic Families: Different Logic families- TTL, ECL, MOS and CMOS, their operation Circuits for INVERTER,NAND, NOR.Transfer Characteristics, noise margin, propagation delay, fan in fan out, power dissipation consideration. | 6 |
| Unit IV | Data Processing Circuits MSI CHIPS: Multiplexer, Decoder, Decoder driver, 7 segment display decoder driver, Encoders Octal to Binary, Decimal to BCD encoders, Priority encoders. Implementation of combinational circuit by MSI chip. | 6 |
| Unit V | Sequential Circuits: The RS flip-flop, D, T, JK Flip flop. Edge triggered Flip Flops, master Slave FF. Counter. Asynchronous and Synchronous counter, higher Modulus counters. Multimode counter. Registers Serial and Parallel Shift registers, Universal Shift Registers. Shift register Counter. | 10 |

**TEXT BOOKS/
REFERENCE
MATERIAL**

1. Digital Systems: Principles and Applications, Ronald J .Tocci, 6th Ed, Prentice Hall of India,New Delhi.2001
2. Digital Principles and Applications, A.P.Malvino, D.P.Leach, 4th Ed ,Tata McGraw Hill, New Delhi.1993
3. Fundamentals of Logic Design, C.A.Roth, Jr., Jaico, 4th Ed, Publishing House,Bombay,2013
4. Digital Design. Morris Mano. 4th Ed. PHI, 2008
5. Fundamentals of Digital Circuits, A. Anand Kumar, 4th Ed. PHI, 2016
6. Digital Integrated Electronics- H.Taub & D.Shilling, 1st Ed. Mc Graw Hill.1977
7. Modern Digital Electronics R.P Jain, 4th Ed. TMH, 2010

DEPARTMENT: Electronics and Communication Engineering.

COURSE NUMBER: EC 3202.

TITLE OF COURSE: Electronic Engineering Materials.

DESIGNATION: REQUIRED ~~ELECTIVE~~ course

PRE-REQUISITES: PH3101 for ITI students or Class 11/12 Physics for NEE II students.

| | | | | | |
|----------------------------------|---------|----------|--------------------|---------------|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
| | 3 | 0 | 0 | 3 | 3 |
| COURSE ASSESSMENT METHODS | | | Assignments & Quiz | 20% of 100 | |
| | Theory | | Mid-Semester Exam | 30% of 100 | 100 |
| | | | End-Semester Exam | 50% of 100 | |

COURSE OUTCOMES

- CO1** Understanding of the properties of conducting materials, their alloys and knowledge of semiconducting materials, their types, carrier concentration and fermi distribution function.
- CO2** Define magnetic materials and describe their properties.
- CO3** Understand the optical properties of materials and their applications.
- CO4** Discuss the various properties of Insulating, piezo-electric and dielectric materials.

TOPICS COVERED

| | | |
|----------|--|------------------------|
| Unit I | Conducting materials - Effect of temperature on resistivity of different conducting materials, Metal and alloys for fuses, Properties and specifications of wire, cable and antenna material. Semiconducting materials - Element and compound semiconductors and their properties, Carrier concentration in semiconductors, Variation of fermi level and carrier concentration with temperature, Hall effect. | Lectures 12 |
| Unit II | Magnetic materials – Different types of magnetic materials and their properties, Diamagnetism, Paramagnetism, ferromagnetism, anti-ferromagnetism and ferrimagnetism. Hard and Soft magnetic materials, Magnetic materials used at high frequencies. Frequency dependence of dielectric constant; Ferroelectricity and Piezoelectricity in materials. | 10 |
| Unit III | Optical properties of materials: metals, insulators and semiconductors, | 10 |

Phosphorescence and fluorescence, Different phosphors used in CRO screens, Liquid crystal as display, materials for LEDs, Photoconductivity and photo conducting materials. Light interaction with solids; Absorption, Transmission and Reflection; Luminescence; Photoconductivity; Lasers.

Unit IV Insulating materials- Atomic interpretation of dielectric material of mono atomic gases and poly atomic molecules, general feature of static dielectric constant of solids, piezo electricity and piezoelectric materials, Dielectric properties in alternating fields: Frequency dependence of electronic and ionic polarizability, complex dielectric constant, dielectric relaxation and losses, temperature dependence, superconductors. 10

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Electronics Engineering Materials and Devices, John Allyson, 1st Ed. ,Tata McGraw Hills 1973
2. Introduction to Materials Science for Engineers, James Shakelfolk, 6th Ed. Macmillan Publishing Co. 2007
3. Materials Science and Engineering, V. Raghavan, 2nd Ed. Prentice Hall of India. 2015
4. Electrical Engineering Materials, A.J.Dekker, 3rd Ed. Prentice Hall of India, New Delhi 2007

DEPARTMENT: Mechanical Engineering
COURSE NUMBER: ME-3277
TITLE OF COURSE: Comprehensive Workshop –III (Audit)
DESIGNATION: REQUIRED(AUDIT) /~~ELECTIVE~~ course for NEE II entrants
PRE-REQUISITES: For the Students who completed a semester

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|-----------------|-----------|----------|-------------------------------------|--------------------------|---------|
| | 0 | 0 | 6 | 6 | 3* |
| | Practical | | Class Work & Viva Practical Exam | 50% of 100 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** Identify the hand tools and instruments.
- CO2** Know the workshop safety.
- CO3** Acquire knowledge related with the working principle of different tools.
- CO4** Acquire measuring skills.
- CO5** Apply practical skills in welding, forging, soldering and brazing.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | Introduction to safety aspects in workshop and different tools (functions, types and specifications) used in different shops. | 6 |
| Unit II | Carpentry Shop: Introduction to woodworking, kinds of woods, hand tools and wood working machines etc.; Simple joints. | 10 |
| Unit III | Fitting Shop: Introduction to fitting shop tools (functions, types and specifications) equipment and operations. Fitting jobs. | 10 |
| Unit IV | Welding & Forging Shop: Introduction to gas and arc welding, Soldering& brazing Practice. Simple forging job. | 4 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Workshop Technology (Vol I & II) – Hazra & Chowdhury , MPP Ltd. 6

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-3221.
TITLE OF COURSE: Basic electronics circuits and devices(CS and EE)
DESIGNATION: REQUIRED /ELECTIVE course

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|----------------------------------|-----------|----------|--|-------------------------------------|---------|
| | 3 | 0 | 4 | 7 | 5 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 60 30% of 60 50% of 60 | 60 |
| | Practical | | Class Work & Viva Practical Exam | 50% of 40 50% of 40 | 40 |

COURSE OUTCOMES
CO1

To understand the working principle of a PN junction diode.

| | | |
|-----------------------|--|-----------------|
| CO2 | To understand the different modes of transistor operation, transistor classifications. | |
| CO3 | Understanding the concept of oscillators. | |
| CO4 | To understand operational amplifier applications and concept of FET, MOSFET. | |
| TOPICS COVERED | | lectures |
| Unit I | PN Junction: PN Junction: Junction formation, step PN junction at equilibrium, PN junction capacitance, breakdown of junctions, PN junction forward bias, IV characteristics. Diode Characteristics: Diode as a circuit element, Load line concept; Large signal diode model, small signal diode model, Theory of Zener diode and regulator circuit. Display Devices: LED, LCD and seven segment display (Common anode/cathode). Regulated Power Supply: Working principles of regulated power supply, Regulator ICs | 12 |
| Unit II | Transistors: Basic principles of operation, I/V Characteristics, Modes of operation: Active, saturation and Cut off alpha, beta. Amplifier configuration: CE,CB,CC, Biasing of Transistors, Load line and Q point. | 5 |
| Unit III | Power Amplifiers: Introduction to class A,B and amplifier Circuits. Simple calculation of Voltage/Current gain (Using simplified pi model). Input/Output impedance. Power amplifier. Elementary ideas on feedback amplifier with example circuits and properties. | 7 |
| Unit IV | Oscillators: Operation of Colpitts and Hartley Oscillator, other oscillators, configurations and their specific applications. Introductory idea and uses of multivibrators : Astable, Monostable and Bistable. | 6 |
| Unit V | Operational Amplifier: Introduction to op-amp, uses of opamp as inverting, non inverting amplifiers, adder, subtractor, integrator and differentiator. JFETs & MOSFETs: JFET introductory ideas, MOSFET MOSFET :Structure, physical behaviour, I/V characteristics, NMOS, PMOS, CMOS, MOS amplifiers and logic gates. | 12 |

- TEXT BOOKS**
1. Electronic Devices and Circuit theory, 8th ed. by Robert L boylestad and Louis Nashelshky.
 2. Electronics Principles by A.P. Malvino (TMH)
 3. Microelectronics by J. Millman and Arvin Gabel.(TMH)
 4. Integrated Electronics by J. Millman and C.C Halkias.(TMH)

DEPARTMENT: Humanities and Social Sciences
COURSE NUMBER: HS 4101
TITLE OF COURSE: Principles of Economics

DESIGNATION: REQUIRED ~~AELECTIVE~~ course

PRE-REQUISITES: For the Students who completed a semester

| | | | | | |
|----------------------------------|---------|--------------------|------------|---------------|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
| | 3 | 0 | 0 | 3 | 3 |
| COURSE ASSESSMENT METHODS | | Assignments & Quiz | | 20% of 100 | |
| | Theory | Mid-Semester Exam | | 30% of 100 | 100 |
| | | End-Semester Exam | | 50% of 100 | |

COURSE OUTCOMES

- CO1** Learning and improving the knowledge about Economics and its theoretical concepts.
CO2 Learning consumer's behaviour for obtaining maximum satisfaction from their expenditure.
CO3 Acquiring knowledge about elasticity of demand for taking decisions about production.
CO4 Obtaining knowledge about Production Theory, Costs and Theory of Supply, price and output decision under various market systems.
CO5 Estimating National Income and decision making at various economic situations.

| | | |
|-----------------------|--|-----------------|
| TOPICS COVERED | | Lectures |
| Unit I | Definition, of economics, Scope of economics, Micro vs. Macroeconomics, Basic Problems of Economy, Consumers' Behaviour, Utility Analysis. | 6 |
| Unit II | Indifference curve theory, supply and demand theory, General equilibrium, elasticity of demand. | 10 |
| Unit III | Theory of production, Cost of production, supply functions, Revenue functions, Producers equilibrium. | 10 |
| Unit IV | Price and output determination under different market situations. | 7 |
| Unit V | National Income, Business Cycle, Exchange rate, Inflation & Deflation. | 9 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. Microeconomic Analysis – R. R. Barthwal, Wiley Eastern Ltd. New Delhi, 19
2. Principles of Microeconomics - D. D. Tewari & K. Singh, New Age International, New Delhi, 1996.
3. Microeconomics - Kourtsoyanis, ELBS, McMillan, London, 1985.
4. Principles of Economics - M L Seth and L N Agrawal, Educational Publication, Agra, 1995.
5. Economics – P. A. Samuelson & W. D. Nordhaus, Tata McGraw Hill Publications, New Delhi, 2002.
6. Principles of Economics – K. E. Case & R. C. Fair, Pearson Education, New Delhi, 2007.

DEPARTMENT: Electrical Engineering

COURSE NUMBER: EE 4121

TITLE OF COURSE: Electrical Engineering

DESIGNATION: REQUIRED ~~ELECTIVE~~ course

PRE-REQUISITES: Basic Electronics

| COURSE ASSESSMENT METHODS | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|---------------------------|-----------|----------|--------------------|---------------|---------|
| | | 3 | 0 | 2 | 5 |
| | Theory | | Assignments & Quiz | 20% of 75 | |
| | | | Mid-Semester Exam | 30% of 75 | 75 |
| | | | End-Semester Exam | 50% of 75 | |
| | Practical | | Class Work & Viva | 50% of 25 | |
| | | | Practical Exam | 50% of 25 | 25 |

**COURSE
OUTCOMES**

- CO1** Understand the basics of electrical components and the importance of circuit analysis and the construction and principle of operation of the transformers.
- CO2** Understand principle and different characteristics of dc machine, single phase and three phase ac machines.
- CO3** Familiarize with various measuring instruments and electromechanical energy conversion.
- CO4** Realize different parameters and characteristics for electrical machines and measuring instruments.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | Introduction to Circuit Elements: Resistance, Capacitance and Inductance and their behavior with ac and dc. Different types of sources and equivalent conversions. Test signals, assumptions for circuit analysis, classification of elements | 6 |
| Unit II | Transformer: principle of operation, construction of single phase transformer, types, EMF equation, equivalent circuit, phasor diagram of transformer on load and no load condition, transformer losses, efficiency and voltage regulation, autotransformer: construction, working and applications. | 10 |
| Unit III | Electro-mechanical energy conversion, torque, rotating magnetic fields, d.c machines: types, construction, motor and generator action, performance characteristics of motor and generator, voltage and speed regulation, speed control, losses in dc machine and applications | 10 |
| Unit IV | A.C machines: alternators, three-phase induction motor, their construction, working principle, performance characteristics, starting, single phase induction motors, causes and effect of low power factor, power factor improvements, | 7 |
| Unit V | Measuring instruments: moving iron and moving coil type voltmeter, ammeter, principle of operation, construction, extension of range, wattmeter and energy meters, methods of single and three phase power measurements. | 9 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. A Course in Electrical Circuit Analysis, Soni and Gupta, Dhanpat Rai and Sons, Delhi, latest edition
2. Networks and Systems, D. Roy Chaudhury, New Age International, New Delhi, 1996
3. Electrical Machines, by S.K Bhattacharya, TMH, 2/e, 1998 (Re-print 2005).
4. Problems in Electrical Engineering, Parker Smith, CBS Publication, New Delhi, latest edition.
5. Fundamentals of Electrical Engineering and Electronics by B.L. Theraja, S.Chand Publication, 2003
6. Electrical Machines by B Gupta, SK Kataria and Sons, New Delhi.
7. A Course in Electrical Measurement and Measuring Instruments by AK

- Sawhney and PL Bhatia; Dhanpat Rai and Sons, New Delhi, 1999
 8. Basic Electrical Engineering by Fitzgerald, Mc-Graw Hill, 1981

DEPARTMENT: Electronics and Communication Engineering
COURSE NUMBER: EC 4100
TITLE OF COURSE: Communication Engineering
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: Basics of Communication Engg for ITI students or EC3102 for NEE II Students

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|--------------------|-----------|---------------|---------|
| | 3 | 0 | 2 | 5 | 4 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | | 20% of 75 | 75 |
| | | Mid-Semester Exam | | 30% of 75 | |
| | Practical | End-Semester Exam | | 50% of 75 | 25 |
| | | Class Work & Viva | | 50% of 25 | |
| | | Practical Exam | | 50% of 25 | |

COURSE OUTCOMES

- CO1** Learn about the signals used in communication, basic signal analysis techniques.
- CO2** Have the concept of AM, FM, PM modulation techniques.
- CO3** Understand and analyse EM Waves, their propagation characteristics and EM spectra.
- CO4** Interpret the concept of antenna applications and its basic theory.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | Introduction to various types of signals used in communication engineering and their Mathematical representations. Brief study of mathematical tools: Fourier series, Fourier Transform. | 8 |
| Unit II | Detailed study and analysis of AM, FM and PM and their respective Demodulation Techniques, Advantages of FM over AM. AM Limiters. Pre-emphasis and De-emphasis. Block schematics of different Broadcasting Transmitters for AM, FM, SSB, ISB systems. Block schematics of different Communication Receivers covering Super heterodyne technique. | 10 |
| Unit III | Introduction to Pulse Modulation techniques- PAM, PPM, PDM and PCM systems. TDM and FDM systems and their comparison. | 8 |
| Unit IV | Propagation of EM waves- Propagation characteristics of surface, sky and space waves. Propagation characteristics at different frequencies. Classification of EM Spectra. Fundamentals of Electromagnetic Radiation. | 9 |
| Unit V | Antennas- (Qualitative treatment only) Various parameters: Gain, Directivity, Power gain, Aperture, Radiation pattern, Beam angle etc. Point source. Propagation of Radio waves. | 7 |

TEXT BOOKS, AND/OR REFERENCE MATERIAL

1. Introduction to Analog and Digital Communication, Simon Haykin John Wiley & Sons 2009
2. Electronic Communication Systems, G. Kenedy&Bernard, 4th Ed. Tata McGraw Hill 1999
3. Electronics Communication, Roody&J.Coolen, 4th Ed. Prentice Hall 1977
4. Modern Digital and Analog Communication System, B.P.Lathi, 4th Ed. Oxford University Press, 2010

DEPARTMENT: Electronics and Communication Engineering
COURSE NUMBER: EC 4101
TITLE OF COURSE: Signal and Systems
DESIGNATION: REQUIRED ~~ELECTIVE~~ course

PRE-REQUISITES:

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|-----------------|---------|----------|-----------|---------------|---------|
|-----------------|---------|----------|-----------|---------------|---------|

| | | | | | |
|----------------------------------|-----------|--------------------|-------------------|-----------|-----------|
| | 3 | 1 | 2 | 6 | 5 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | Mid-Semester Exam | 20% of 80 | 30% of 80 |
| | Practical | End-Semester Exam | Class Work & Viva | 50% of 80 | 50% of 20 |
| | | Practical Exam | | 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** Represent and characterize the signals and systems using linear algebra.
- CO2** Classify systems based on their properties and determine the response of LTI system using convolution.
- CO3** Analyse the spectral characteristics of continuous-time and discrete-time periodic-aperiodic signals using Fourier analysis.
- CO4** Apply the Laplace transform and Z- transform to analyse continuous-time and discrete-time signals and systems and understand the process of sampling and the effects of under sampling.

TOPICS COVERED

| | | Lectures |
|----------|---|----------|
| Unit I | Continuous and discrete time signals: Classification of Signals, Transformation of independent variable of signals, Basic continuous-time and discrete-time signals. | 4 |
| Unit II | Basic system properties. Analysis of Continuous-time and Discrete-time LTI Systems and their properties. Linear constant co-efficient differential and difference equations. | 8 |
| Unit III | Fourier-series and Fourier Transform representation of Continuous-time Signals and their properties. Discrete-Time Fourier-series and Discrete-Time Fourier Transform representation of discrete-time Signals and their properties. | 11 |
| Unit IV | Laplace Transform and its properties. Unilateral Laplace Transform. Analysis of LTI systems using Laplace-transform. Z-transform and its properties. Unilateral Z-Transform. Analysis of LTI systems using Z - transform. | 11 |
| Unit V | Sampling and reconstruction of band limited signals. Low pass and band pass sampling theorems. Aliasing. Anti-aliasing filter. Practical Sampling-aperture effect. | 8 |

TEXT BOOK/ REFERENCE MATERIAL

1. Signals & Systems, Alan V. Oppenheim, Alan S. Willsky , S. Hamid Nawab, 2nd Ed., Pearson Education. 2013
2. Signals and Systems, S.Haykin and B. VanVeen , 2nd Ed. Wiley.2007
3. Signal Processing and Linear Systems, B.P.Lathi, PHI 2009
4. Principles of Linear Systems and Signals, B.P. Lathi, 2nd Ed. Oxford.2009

DEPARTMENT: Electronics and Communication Engineering.

COURSE NUMBER: EC-4102

TITLE OF COURSE: Microprocessor and Computer Organization

DESIGNATION: REQUIRED ~~ELECTIVE~~ course

PRE-REQUISITES: EC 3201

COURSE DETAILS:

| | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|--------------------|-------------------|---------------|-----------|
| | 3 | 1 | 2 | 6 | 5 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | Mid-Semester Exam | 20% of 80 | 30% of 80 |
| | Practical | End-Semester Exam | Class Work & Viva | 50% of 80 | 50% of 20 |
| | | Practical Exam | | 50% of 20 | 20 |

COURSE OUTCOMES

- CO1** Study the organization of processors and memory hierarchies used in computer and examine information flow in memory organization.
- CO2** Discuss the architecture of 8085 processor, instruction sets and timing diagram.
- CO3** Have the concept of micro and macro programming.
- CO4** Understand various interrupts and the concept of interfacing.

TOPICS COVERED

Lectures

| | | |
|----------|--|----|
| Unit I | Concepts and Terminology: Digital computer concepts; Von-Neumann and Harvard architectures concept, Hardware and Software and their nature, role of operating system Evolution of computer architectures, different generations RISC and SISC architecture. | 6 |
| Unit II | Memory Unit : Memory classification, characteristics, static memories, dynamic memories, Organization of RAM, address decoding, ROM/PROM/EEPROM, Concept of memory map, memory hierarchy, Associative memory organization, Cache introduction, Replacement algorithms, Hit rate, miss penalty. Concept of virtual memory and paging. | 8 |
| Unit III | Microprocessors: Architecture of Intel 8085A microprocessor. Register organization, pin description. Instruction sets, operand addressing modes, instruction cycle, machine cycle, Timing diagram. Introduction to 8066/8088/X86. | 8 |
| Unit IV | Programming: Concept of Micro and Macro programming, arithmetic and logical computations, block of data moving looping, counting, time delaying operations. Stack and subroutines, Concept of stack memory. | 10 |
| Unit V | Interrupts and Peripherals: Vectored interrupts, maskable and unmaskable interrupts. Intel 8085 software and hardware interrupts and their working mechanism. Usage of RIM, and SIM instructions. Peripherals: Introduction to I/O addressing. Study of peripherals like Intel 8255, 8257, 8254 and 8251. | 10 |

**TEXT BOOKS/
REFERENCE
MATERIAL**

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Ed. McGraw Hill International, 2001
2. Computer Architecture and Organization, J.P.Hayes, 3rd Ed. Mc Graw Hill International, 1998
3. Microprocessor Architecture Programming Application with the 8085/8080A, R.S. Gaonkar, 6th Ed. Prentice Hall of India, 2013
4. Introduction to Microprocessors, A.P.Mathur, 3rd Ed. Tata McGraw Hill, 2001
5. Fundamental of Microprocessor and Microcomputers, B. Ram, 1st Ed. Dhanpat Rai & Sons. 2005

DEPARTMENT: Electronics and Communication Engineering
COURSE NUMBER: EC4103
TITLE OF COURSE: Electronic Instrumentation and Measurements

DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: Basics of Instrumentation Engineering

| | | | | | |
|----------------------------------|-----------|--------------------|-------------------|---------------|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
| | 3 | 1 | 2 | 6 | 5 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | Mid-Semester Exam | 20% of 80 | 80 |
| | | | End-Semester Exam | 30% of 80 | |
| | Practical | Class Work & Viva | Practical Exam | 50% of 20 | 20 |
| | | | | 50% of 20 | |

**COURSE
OUTCOMES**

- CO1** Concepts of generalized measurement system, AC and DC bridges fore measurement of different passive circuit components.
- CO2** Recognize the kind of instrument suitable for typical measurements and understand the concepts popular instruments like cathode ray oscilloscope and its usages.
- CO3** Acquire the details of various transducers which are used to measure strain, temperature etc.
- CO4** Examine various data acquisition system and general purpose interfacing bus and its applications. Identify techniques to utilize the instruments for the optimum performance.

TOPICS COVERED

| | | |
|----------|--|----------|
| | | Lectures |
| Unit I | Generalized Measurement system: Accuracy, Precision, Fidelity, speed of response, static & dynamic performance characteristics, dynamic- step response, ramp response of first order instrument. Classifications of errors, error analysis of measurement. | 6 |
| Unit II | Introduction to DC and AC bridges for measurement of voltage / current / resistance / capacitance and inductance. | 10 |
| Unit III | Digital multimeter, Signal generator and Function generator using multi op-amp and crystal. | 10 |
| Unit IV | Frequency synthesizers (digital and analog). Principle and Working of voltmeter, ammeter and ohmmeter, Introduction to DVM, Electronic multimeter. Cathode Ray | 7 |

Oscilloscope- Introduction, cathode ray tube, electron gun, deflection plates, basic CRO circuit, Lissajous pattern.

Unit V Definition of transducer, classification, resistive, capacitive, inductive, magnetic, optical, piezoelectric, pneumatic.

9

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. Principles of Electronics instrumentation and measurements. Berlyn and Getz(McMillan Pub.Co.)
2. A Course in Electrical Electronics Measurements and instrumentation. A.K. Sawhney (Dhanpat Roy & Co.).
3. Modern Electronics Instrumentation and Measurement Techniques Albert D.Heltrick, W. D. Cooper. (PHI).
4. Murthy DVS – Transducers & Instrumentation, PHI, ND, 1995.
5. Elements of Electronic Instrumentation and Measurement. Joseph J. Carr. Pearson Education
6. PC-Based Instrumentation Concept and Practice N. Mathivanan PHI

DEPARTMENT: Electronics and Communication Engineering
COURSE NUMBER: EC 4121
TITLE OF COURSE: Electronics circuits and devices (CS and EE)
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: Basics of analog electronics.

COURSE DETAILS:

| | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|-----------|----------------|--------------------|---------------|---------|
| | 3 | 0 | 2 | 5 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 75 | 75 |
| | | | Mid-Semester Exam | 30% of 75 | |
| | | | End-Semester Exam | 50% of 75 | |
| | Practical | | Class Work & Viva | 50% of 25 | 25 |
| | | Practical Exam | 50% of 25 | | |

COURSE OUTCOMES

- CO1** Learn about the amplifiers and their applications.
- CO2** Have the concept of power supply and regulators.
- CO3** Understand and analyse tuned amplifier and oscillators.
- CO4** Interpret the concept of thyristor family components and their operations.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | BJT Amplifier: Analysis of BJT amplifier, analysis of differential amplifiers. OP-AMPS: Introduction to op-amp, offset voltage/currents, CMRR, opamp buffer, half wave & full wave rectifier, active filters (first and second order LP,HP and BP), performance comparison of typical op-amp (741C,LM411, LM118, LM108, QD611.) | 10 |
| Unit II | Regulated Power Supply: Regulated power supply design, capacitive(CRC) filter based power supply, Linear series regulators, single op-amp regulator, three terminal regulators, adjustable power supply, Linear ICs such as LM78XX, LM79XX, LM317, LM 337, Switched capacitor conversion (LM-7660). Switching power supply, Basic principles, Buck regulator, Boost regulator. | 7 |
| Unit III | Tuned Amplifiers: Single tuned circuit, FET & BJT amplifier, FET tuned amplifier, tuned transistor amplifier with tuned load, narrow band approximation and tuning (Synchronous & Stagger), cascade tuned IF amplifier, Design of tuned amplifier, oscillator possibility and sensitivity. Oscillators: Wein bridge, phase shift, twin T and crystal oscillators. | 10 |
| Unit IV | Feedback Amplifier: Classification of feedback amplifier, feedback concept, principles of operation of four types of feedback amplifiers,(Voltage series/shunt, current series/shunt), input impedance, output impedance, band width, gain desensitivity, merits and demerits. | 7 |
| Unit V | Power Switches and ICs: Introductory idea and use of SCR, Diac, Triac and UJT circuits. Integrated Circuits: Introduction to IC, familiarization with popular IC NE/SE-555, 7400 7402, 7406, Audio and Video amplifiers. | 8 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. 1.Basic Electronics and Linear Circuits, 6th Ed., N.N. Bhargav, D.C. Kulshreshta, S.C.
2. Gupta,Tata McGraw Hill, New Delhi, 2001
3. 2. Electronics Principles, 6th Ed., A.P. Malvino, Tata McGraw Hill, New Delhi, 1999.
4. 3. Micro Electronics, 2nd Ed., J. Millman, Arvin Grabel, Tata McGraw Hill, New Delhi,1999.

5. 4. Integrated Electronics, J. Millman, & C.C. Halkias, Tata McGraw Hill, New Delhi, 1999

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4200
TITLE OF COURSE: LINEAR INTEGRATED CIRCUITS.
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: EC 3200

| COURSE ASSESSMENT METHODS | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|---------------------------|-----------|----------------|--------------------|---------------|---------|
| | | 3 | 0 | 2 | 5 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 75 | 75 |
| | | | Mid-Semester Exam | 30% of 75 | |
| | | | End-Semester Exam | 50% of 75 | |
| | Practical | | Class Work & Viva | 50% of 25 | 25 |
| | | Practical Exam | 50% of 25 | | |

COURSE OUTCOMES

- CO1** To understand the concept of feedback, types of feedback and its effect on the frequency response.
CO2 To understand the basic characteristics of an OPAMP stressing on CMRR , slew rate.
CO3 To understand the principle of oscillation, types of oscillators and design.
CO4 To understand the different types of OPAMP filters, comparators and convertors.

TOPICS COVERED

| | | lectures |
|----------|---|----------|
| Unit I | Feedback amplifier: Feedback concept, characteristics of negative and positive feedback. Four feedback topologies, effect of negative and positive feedback on input impedance, output impedance, voltage gain, band width, noise and frequency response. | 10 |
| Unit II | OPAMP: characteristics, open loop gain, negative feedback configurations, amplifier, differential amplifiers, linear and non-linear applications. | 10 |
| Unit III | OSCILLATORS: Classification, Barkhausen Criterion, frequency stability, Tuned based Oscillators, Hartley Oscillator, Colpitts Oscillators, Clapp Oscillator, Crystal Oscillator, Phase Shift Oscillator, Wein Bridge Oscillator, voltage controlled oscillator Oscillator circuit design using BJT, FET and OP-AMP | 10 |
| Unit IV | ACTIVE FILTERS, COMPARATORS and CONVERTERS: classification and characterization of filters, types of active filters-first order and second order. Comparator and its characteristics, zero crossing detector, voltage limiters, absolute value detectors, analog multipliers and types of signal generators. Converters : types of ADC and DAC, working principle, characteristics. PLL and its applications. | 12 |

TEXT BOOKS

- Operational Amplifiers with Linear Integrated Circuits 4th Edition, Author(s): William D. Stanley, Publisher: Pearson (2004)
- Op-Amps and Linear Integrated Circuits 4 Edition Author(s): Ramakant A. Gayakwad Publisher: PHI Learning (2009)
- Electronics Principles By: A. P. Malvino, Tata McGraw Hill
- Microelectronic By: adel S. Sedra and C Smith, Oxford university press.
- Integrated Electronic circuits By: J. Millman and C.C.Halkias, TMH.
- Pulse Digital and Switching Waveforms By: Taub and Shilling, TMH.
- Electronic Devices and Circuits, Fourth Edition by David A. Bell. (PHI).
 Electronics Circuits By: D. Shilling, Tata McGraw

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4201
TITLE OF COURSE: Industrial Electronics
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: EC 3200

| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|-----------------|---------|----------|------------|---------------|---------|
| | 3 | 0 | 2 | 5 | 4 |

| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | 20% of 75 | 75 |
|---------------------------|-----------|--------------------|-----------|----|
| | | | | |
| | | End-Semester Exam | 50% of 75 | |
| COURSE ASSESSMENT METHODS | Practical | Class Work & Viva | 50% of 25 | 25 |
| | | | | |

COURSE OUTCOMES

- CO1 Explain the basic structure and V-I characteristics of various power devices.
- CO2 Analysis of resistive and inductive loads in line frequency phase controlled rectifiers using SCR.
- CO3 AC regulators, Cycloconverters and Choppers- basic principle of operation.
- CO4 Introduction on Switching regulators - buck regulators - boost regulators- buck-boost regulators.

TOPICS COVERED

| | | Lectures |
|----------|---|----------|
| Unit I | Power diodes - basic structure and V-I characteristics - various types - power transistors - BJT, MOSFET and IGBT - basic structure and V-I characteristics - thyristors - basic structure - static and dynamic characteristics - device specifications and ratings - methods of turning on - gate triggering circuit using UJT - methods of turning off - commutation circuits - TRIAC | 10 |
| Unit II | Line frequency phase controlled rectifiers using SCR - single phase rectifier with R and RL loads - half controlled and fully controlled converters with continuous and constant currents - SCR inverters - circuits for single phase inverters - series, parallel and bridge inverters - pulse width modulated inverters - basic circuit operation. | 10 |
| Unit III | AC regulators - single phase ac regulator with R and RL loads- sequence control of ac regulators - cycloconverter - basic principle of operation - single phase to single phase cycloconverter - choppers - principle of operation - step-up and step-down choppers - speed control of DC motors and induction motors. | 11 |
| Unit IV | Switching regulators - buck regulators - boost regulators - buck-boost regulators - cuk regulators - switched mode power supply - principle of operation and analysis - comparison with linear power supply - uninterruptible power supply - basic circuit operation - different configurations - characteristics and applications | 11 |

TEXT BOOKS

1. Ned Mohan et.al, Power Electronics, John Wiley and Sons, 1989
2. Sen P.C., Power Electronics, Tata Mc Graw Hill,2003
3. Rashid, Power Electronics. Prentice Hall India,1993
4. G.K. Dubey et.al, Thyristorised Power Controllers, Wiley & Sons, 2001
5. Dewan & Straughen, Power Semiconductor Circuits, Wiley & Sons, 1984
6. Singh M.D & Khanchandani K.B., Power Electronics, Tata Mc Graw Hill, 1998

DEPARTMENT: Electronics and Communication Engineering

COURSE NUMBER: EC 4202

TITLE OF COURSE: Microcontrollers and Applications

DESIGNATION: ~~REQUIRED~~ /ELECTIVE course

PRE-REQUISITES: EC 3201 and EC 4102 and basics of electronics

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|---------------------------|-----------|--------------------|-----------|---------------|----------------|
| | | 3 | 0 | 2 | 5 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | 20% of 75 | 75 | |
| | | Mid-Semester Exam | 30% of 75 | | |
| | | End-Semester Exam | 50% of 75 | | |
| COURSE ASSESSMENT METHODS | Practical | Class Work & Viva | 50% of 25 | 25 | |
| | | | | | Practical Exam |

COURSE OUTCOMES

- CO1 Know about the evolution of microcontrollers.
- CO2 Acquire knowledge of assembly language programming.
- CO3 Learn the idea of different addressing modes of microcontroller.

| | | | |
|--|------------|---|----------|
| | CO4 | Discuss serial communication and interfacing with devices. | lectures |
| TOPICS COVERED | | | |
| | Unit I | The 8051 microcontroller: Evolution of microcontrollers, overview of the 8051 family. | 7 |
| | Unit II | Assembly language programming: Arithmetic, logical, jump, loop, call instructions. Input/Output port programming: pin descriptions of the 8051, I/O programming; bit manipulation | 9 |
| | Unit III | Addressing modes: Immediate and register addressing modes; memory accessing. Timer/Counter programming. | 9 |
| | Unit IV | Serial communication: basics, connection to RS232 and programming. Interrupts: different types and their programming | 8 |
| | Unit V | Real world interfacing: LCD, ADC, Sensors, stepper motors, keyboards | 9 |
| | | Introduction to advance microcontrollers, architecture of PIC/ARM/ AVR. | |
| TEXT BOOKS, AND/OR REFERENCE MATERIAL | | 1. The 8051 Microcontroller and Embedded Systems, M. A. Mazidi, and J.G. Mazidi, Pearson Education | |
| | | 2. Microcontroller Projects in C for 8051, D. Ibrahim, Newnes | |
| | | 3. D.V. Gadre, Programming and customizing the AVR Microcontroller, TMH, 2 nd Ed. | |
| | | 4. John B. Peatman, Design with PIC Microcontroller, Pearson. | |

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4203.
TITLE OF COURSE: Network Analysis and Synthesis.
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: EC-3100, EC-4101

| | | | | | |
|----------------------------------|---------|----------|--------------------|---------------|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practicals | Contact Hours | Credits |
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz | 20% of 100 | |
| | | | Mid-Semester Exam | 30% of 100 | 100 |
| | | | End-Semester Exam | 50% of 100 | |

COURSE OUTCOMES

- CO1** Compute responses of first, second and higher order networks using time domain analysis and Laplace Transform to solve for circuit response.
- CO2** Understanding LTI two port systems using the popular parameters and solving them.
- CO3** Synthesizing networks using RL, RC and LC circuits.
- CO4** Applying graph theory for network analysis,

| | | | |
|-----------------------|----------|--|----------|
| TOPICS COVERED | | | lectures |
| | Unit I | Review of Network Theorems, Formulations of network equations: First –order systems, Natural response, Initial conditions, complete response of First- order systems, zero state and zero input responses. Second order system, Natural response, Overdamped, Underdamped and critically damped case. Geometry of plane, unit-step and unit impulse response, linear system with sinusoidal inputs, impedance and admittance, power, concept of Complex frequency. | 12 |
| | Unit II | Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response. Characterization of LTI two port networks ZY, ABCD and h-parameters, reciprocity and symmetry. Inter relationships between the parameters, inter-connections of two port networks. | 9 |
| | Unit III | Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms. | 11 |
| | Unit IV | Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis. | 10 |

**TEXT BOOKS,
AND/OR REFERENCE
MATERIAL**

1. " Network Analysis", M.E. Van Valkenburg, Prentice Hall of India
2. "An Introduction to Circuit analysis: A System Approach" Donald E. Scott McGraw Hill Book Company.
3. 'Circuit Theory" A.Chakrabarti, Dhanpat Rai and Co.
4. "Networks and Systems" D.Roy Choudhary, Wiley Eastern Ltd.
5. "Engineering Circuit analysis" W.H. Hayt and Jack E-Kemmerly, Tata McGraw Hill.
6. Linear Circuits, Ram Kalyan, Oxford University Press.

DEPARTMENT: Electronics and Communication Engineering
COURSE NUMBER: EC 4251
TITLE OF COURSE: Computer Hardware and Peripherals
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: Basics of Communication Engg for ITI students or EC3102 for NEE II Students

| COURSE DETAILS: | | Lecture | Tutorial | Practicals | Contact Hours | Credits |
|------------------------|-----------|---------|----------|-------------------------------------|--------------------------|---------|
| | | 1 | 0 | 4 | 5 | 3 |
| | Practical | | | Class Work & Viva Practical Exam | 50% of 100 50% of 100 | 100 |

**COURSE
OUTCOMES**

- CO1** Discuss the history of computing and generation of microprocessor.
- CO2** Have the idea about CPU, Memories, PC Expansion Buses and system clock.
- CO3** Learn about power supply, keyboard, mouse, monitor, controllers, USB, modem, communication ports, sound boards and graphics card.
- CO4** Learn about hardware installation, maintenance and troubleshooting of PC.

TOPICS COVERED

| Unit | Topic | Lectures |
|----------|---|----------|
| Unit I | History of computing and generation of microprocessor | 2 |
| Unit II | Inside the PC: CPU, Memories, PC Expansion Buses, system clock | 3 |
| Unit III | Power supply, keyboard, mouse, monitor | 2 |
| Unit IV | Controllers: Video adapters, Hard disk drive controller, Floppy disk controller, parallel interface, USB. | 3 |
| Unit V | Modem and communication ports, sound boards, graphics card. Trouble shooting of PC- | 4 |

**TEXT BOOKS,
AND/OR
REFERENCE
MATERIAL**

1. Troubleshooting and Maintenance of PC's Mark Minasi (BPB Publication)
2. Troubleshooting and Maintenance of PC's Peter Norton (BPB Publication)

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4299.
TITLE OF COURSE: Project (Diploma)
DESIGNATION: REQUIRED ~~ELECTIVE~~ course
PRE-REQUISITES: All previously studied subjects for the purpose of attaining Diploma

| COURSE DETAILS: | | Lecture | Tutorial | Practical | Contact Hours | Credits |
|------------------------|-----------|---------|----------|-----------------------|---------------|---------|
| | | 0 | 0 | 6 | 0 | 3 |
| | Practical | | | As per Rubrics | | 100 |

COURSE OUTCOMES

- CO1** Acquire the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- CO2** Achieve skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms.
- CO3** Attain collaborative skills through working in a team to achieve common goals.
- CO4** Learn on their own, reflect on their learning and take appropriate actions to improve it.

RUBRICS

| Task | Performance indicators | Good 4 | Satisfactory 3 | Average 2 | Poor 1 |
|---------------------------------|---|--|--|---|---|
| Selection of Topic | Selection of Topic | Selection of the topic by referring literature and discussion with guide in two weeks. | Selection of the topic by referring research journals in a month | Selection of the topic by referring research journals in more than a month | Selection of the topic with the help of the guide |
| | Developing Project Plan & Distribution of work | Splitting the project into small tasks and scheduling them to finish it in time and division of the work among the members of the team is good and coordination in the team is good. | Splitting the project into small tasks and scheduling them to finish it in time and different tasks of the job shared among the members of the team with satisfactory coordination. | Splitting the project into small tasks is not sufficient and sharing different tasks among the team members needs some more attention | Not able to split the project into small tasks. Needs lot of work to be done. |
| Literature Survey | Collection of Literature | Collected related research articles are recent, good and sufficient for the project work. | Collected related research articles are satisfactory for the project work. | Need some more research articles for the project work and need time. | Not collected relevant articles. |
| Performance of the task | Experiment / Analysis/ Industrial Problem | Work completed in all aspects and is ready to prepare the dissertation. | Work completed 80%. Can start preparing the dissertation. | Work completed only 50-60%. Need more attention to compete the tasks. | Work not completed. Need lot of attention. |
| | Team Work | Coordinates team efforts and communication among members is good. | Coordinates team efforts and communication among members is satisfactory. | Requires more coordination and communication among the team | No proper coordination among the team |
| Review | Presentation | Presentation should be good with results and with good figures | Presentation is satisfactory with the results. | Presentation needs some improvement | Presentation is incomplete in all aspects. |
| | Understanding | Understanding the task fully. Knowing all the tasks of the project, 100%. | Ability of correlating the theoretical aspects with the practical aspects is in between 60-80% | Ability of correlating the theoretical aspects with the practical aspects is in between 50-60% | Ability of correlating the theoretical aspects with the practical aspects is less than 50% |
| Dissertation Preparation | Dissertation Preparation | Dissertation prepared with neat sketches, and complete with all the necessary calculations or analysis, contents of the dissertation are well planned and coverage of all the topics is good | Dissertation prepared with neat sketches, and complete with all the necessary calculations or analysis, contents of the dissertation are well planned and coverage of all the topics is satisfactory | Dissertation prepared with sketches and required calculations but needs improvement | Dissertation prepared is not complete in all aspects and the coverage of all the contents is poor |

| | | | | | |
|------------------|----------------------|---|--|---|---|
| Viva-voce | Understanding | Answering 100% questions related to the project | Answering 80% questions related to the project | Answering about 60% of questions related to the project | Answering less than 50% of the questions related to the project |
| | Response | Responding immediately with confidence | Responding and answering to the satisfactory level | Responding with much delay and answering about 50% of the questions | Not able to respond. Understanding the concepts is poor |

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4001.
TITLE OF COURSE: Video and Advanced TV Engineering.
DESIGNATION: ~~REQUIRED~~ /ELECTIVE course
PRE-REQUISITES: EC-3102
COURSE DETAILS:

| | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|---------|----------|--|--|---------|
| | 3 | 1 | 0 | 0 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 100 30% of 100 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** To understand TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes.
- CO2** To analyse the principles of Monochrome Television Transmitter and Receiver systems.
- CO3** To understand the various Colour Television systems with a greater emphasis on PAL system.
- CO4** To analyse the advanced topics in Television systems and Video Engineering.

TOPICS COVERED

| | | Lectures |
|----------|--|----------|
| Unit I | Fundamentals of television: Geometry form and Aspect Ratio, Image Continuity, Number of scanning lines, Camera tubes, Image orthicon - vidicon-plumbicon-silicon diode array, Monochrome picture tubes, Composition- vertical sync, Picture signal transmission: Positive and negative modulation, VSB transmission, Sound signal transmission, Standard channel bandwidth. | 9 |
| Unit II | Monochrome television transmitter and receiver: TV transmitter, TV transmission Antennas, Monochrome TV receiver, RF tuner, UHF, VHF tuner, Digital tuning techniques: AFT-IF subsystems, Video and sound inter carrier detection, Video amplifier circuits, Deflection current waveform, Deflection Oscillators - Frame deflection circuits, EHT generation - Receiver Antennas. | 9 |
| Unit III | Essentials of colour television: Compatibility, Colour perception, Three colour theory, Colour television cameras, Colour television display tubes, Colour picture tubes, Pincushion correction techniques: Automatic degaussing circuit, Grey scale tracking, Colour signal transmission, Weighting factors, Formation of chrominance signal. | 8 |
| Unit IV | Colour television systems: NTSC colour TV system, PAL colour TV system: Cancellation of phase errors, PAL -D colour system, PAL coder, Colour burst separation, Burst phase Discriminator, Reference Oscillator, Ident and colour killer circuits, Merits and demerits of the PAL system, SECAM system: Merits and demerits of SECAM system. | 9 |
| Unit V | Advanced television systems: Satellite TV technology, Cable TV, Tele Text broadcast receiver, Digital television: Transmission and reception, Projection Television: Flat panel display TV receiver, Stereo sound in TV, 3D TV, EDTV, Digital equipments for TV studios. | 7 |

TEXT BOOKS/ REFERENCE MATERIALS

1. Monochrome Television Practice, Principles, Technology and servicing, R.R.Gulati, Second edition, New age International Publishes, 2004
2. Monochrome and colour television, R.R.Gulati, New age International Publisher, 2003
3. Television and Video Engineering, A.M Dhake, Second edition, TMH, 2003.
4. Colour Television, Theory and Practice, S.P.Bali, TMH, 1994

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4002
TITLE OF COURSE: Instrumentation and Process Control
DESIGNATION: ~~REQUIRED~~/ELECTIVE course
PRE-REQUISITES: EC4103 and basics of electronics

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|---------|--------------------|-------------------|---------------|------------|
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | Mid-Semester Exam | 20% of 100 | 30% of 100 |
| | | End-Semester Exam | | 50% of 100 | 100 |

- COURSE OUTCOMES**
- CO1** Understand the basic terms and terminology of instrumentation.
 - CO2** Understand the application of transducers
 - CO3** Study the general idea of process control.
 - CO4** Study the data acquisition in process control system.

| TOPICS COVERED | Lectures |
|---|----------|
| Unit I Fundamental Concept of Instrumentation: Definition of terms, calibration, standards, dimensions and units, basic concepts in dynamic system response, distortion, impedance matching. Causes and types of experimental errors, error analysis on a common sense basis uncertainty analysis and propagation of uncertainty. | 8 |
| Unit II Measurement of Physical Parameters: Introduction to Transducer and types. Measurements of temperature, pressure, relative humidity, moisture content, velocity and flow. | 12 |
| Unit III Introduction to process Control: Process-Control Principles, Servomechanisms. Process-control block diagram, control system evaluation | 10 |
| Unit IV Data Acquisition: Analog Data, Digital Data, Pneumatic data, ON/OFF Control, Analog Control, Digital Control, Direct Digital Control (DDC), Programmable Logic Controllers, Analog Data Representation, Process-Control Drawings | 12 |

- TEXT BOOKS/ REFERENCE MATERIAL**
1. Experimental Methods for Engineers, J. P. Holman Eighth Edition, McGraw Hill International.
 2. Process Control Instrumentation Technology, Curtis D. Johnson, Eighth Edition, Pearson New International Edition.
 3. Principles of Industrial Instrumentation, D. Patranabis, Second Edition, Tata McGraw-Hill Education.
 4. Industrial Instrumentation and Control, Donald P. Eckman, Third Edition, Wiley Eastern Ltd, New Delhi.

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4003
TITLE OF COURSE: Transducer and signal conditioning.
DESIGNATION: ~~REQUIRED~~/ELECTIVE course
PRE-REQUISITES: EC4103 and basics of electronics

| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
|----------------------------------|---------|--------------------|-------------------|---------------|------------|
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | Assignments & Quiz | Mid-Semester Exam | 20% of 100 | 30% of 100 |
| | | End-Semester Exam | | 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** To have general idea of instrumentation.
- CO2** Study the construction, working principles and application of resistive, capacitive and inductive transducer.
- CO3** Study the operation and application of special transducer
- CO4** Study and analysis of analog and digital signal conditioning

TOPICS COVERED

Lectures

| | | |
|----------|--|----|
| Unit I | Introduction: Basic concepts, Definition and classification of transducers, active and passive transducer, Causes and types of experimental errors, error analysis. | 8 |
| Unit II | Transducer : Variable Resistance, capacitance, Inductance transducers, construction, working principle, selection criteria and application of Potentiometer, strain gauge, load cell, Thermistors, Thermocouple, Induction potentiometer, Linear variable differential transformer, Capacitance pick up, Piezoelectric Transducers advantages, disadvantages and limitations | 12 |
| Unit III | Special transducers: Transducers based upon Hall Effect, Optical transducers-photo diode, photo transistor LOR, and LED, Digital transducer-single shaft encoder, Techo generator, Advantage and disadvantage and limitations | 10 |
| Unit IV | Principle of analog and digital signal conditioning : Linearization, Various types of conversions (V to F, F to V, V to I converters and I to V converters),Filtering and impedance matching, A/D conversion, D/A conversion, Multiplexer/ Demultiplexer, Encoder/Decoder, Sample and hold Data Acquisition system (DAS) | 12 |

TEXT BOOKS/ REFERENCE MATERIAL

1. Industrial Instrumentation and Control, Donald P. Eckman, Third Edition, Wiley Eastern Ltd, New Delhi.
2. Electrical and Electronics Measurement and Instrumentation by A.K. Shawney, Dhanpat Rai and Co., New Delhi
3. Experimental Methods for Engineers, J. P. Holman Eighth Edition , McGraw Hill International.
4. Process Control Instrumentation Technology, Curtis D. Johnson, Eighth Edition, Pearson New International Edition.
5. Principles of Industrial Instrumentation, D. Patranabis, Second Edition,Tata McGraw-Hill Education.

DEPARTMENT: Electronics and Communication Engineering.
COURSE NUMBER: EC-4004.
TITLE OF COURSE: Medical Electronics.
DESIGNATION: ~~REQUIRED~~ /ELECTIVE course
PRE-REQUISITES: EC-4103

| | | | | | |
|----------------------------------|---------|----------|--|--|---------|
| COURSE DETAILS: | Lecture | Tutorial | Practical | Contact Hours | Credits |
| | 3 | 1 | 0 | 4 | 4 |
| COURSE ASSESSMENT METHODS | Theory | | Assignments & Quiz Mid-Semester Exam End-Semester Exam | 20% of 100 30% of 100 50% of 100 | 100 |

COURSE OUTCOMES

- CO1** To analyse heart, central nervous system, respiratory and reproduction system.
- CO2** To understand the operation of different types of medical electronics instruments.
- CO3** To analyse and handle the different types of electrodes used in bio-medical system.
- CO5** To understand the sensitive transducers and different types of machine used in bio-medical like ECG, EEG and EMG machines.

TOPICS COVERED

Lectures

| | | |
|---------|--|---|
| Unit I | Anatomy and physiology: Elementary ideas of cell structure, Heart and circulatory system, Central nervous system, Muscle action, Respiratory system, Body temperature and reproduction system. | 8 |
| Unit II | Overview of Medical Electronics Equipments, classification, application and specifications of diagnostic, therapeutic and clinical laboratory equipment, method | 8 |

| | | |
|----------|--|---|
| | of operation of these instruments. | |
| Unit III | Electrodes: Bioelectric signals, Bio electrodes, Electrode, Electrode tissue interface, contact impedance, Types of Electrodes, Electrodes used for ECG, EEG. | 9 |
| Unit IV | Transducers: Typical signals from physiological parameters, pressure transducer, flow, transducer, temperature transducer, pulse sensor, respiration sensor. | 8 |
| Unit V | Bio Medical Recorders and Patient Monitoring Systems: Block diagram description and application of following instruments, ECG Machine, EEG Machine, EMG Machine. Heart rate measurement, Pulse rate measurement, Respiration rate measurement, Blood pressure measurement. | 9 |

**TEXT BOOKS/
REFERENCE
MATERIALS**

1. Handbook of biomedical Instrumentation by RS Khandpur
2. Biomedical Instrumentation by Cromwell,
3. Modern Electronics Equipment by RS Khandpur, TMMH, New Delhi
4. Introduction to BioMedical Electronics by Edward J. Perkestein; Howard Bj, USA

DEPARTMENT: Electronics and Communication Engineering.

COURSE EC-4005

NUMBER:

TITLE OF Basic Satellite Communication

COURSE:

DESIGNATION: ~~REQUIRED~~/ELECTIVE course

PRE- EC4100

REQUISITES:

COURSE

DETAILS:

| | Lecture | Tutorial | Practical | Contact Hours | Credits |
|-------------------|---------|--------------------|-----------|---------------|---------|
| | 3 | 1 | 0 | 4 | 4 |
| COURSE | | Assignments & Quiz | | 20% of 100 | |
| ASSESSMENT | Theory | Mid-Semester Exam | | 30% of 100 | 100 |
| METHODS | | End-Semester Exam | | 50% of 100 | |

COURSE

OUTCOMES

- CO1** Acquire knowledge on orbital mechanics of satellite communication systems.
CO2 Understand the satellite segments.
CO3 Have an in-depth knowledge on earth segments, link design and impairments on it.
CO4 Understand the concept of analog and digital technologies used for satellite communication networks with applications.

TOPICS

COVERED

Lectures

| | | |
|----------|--|----|
| Unit I | Orbital mechanics: Orbital perturbations, Azimuth & elevation angle calculations, limits of visibility, eclipse, sun-transit outage, launches and launch vehicle. | 9 |
| Unit II | Spacecraft systems: Attitude and Orbit control system, Telemetry, tracking and command (TT&C), communications subsystems, Transponders, Spacecraft antennas. | 9 |
| Unit III | Earth Segments: Earth station antennas, Amplifiers, Converters, Reliability, Basic transmission theory of satellite link, noise figure and noise temperature, satellite uplink and down link analysis, Propagation on Satellite-Earth Paths and its Influence. | 12 |
| Unit IV | Satellite Access and Applications: Analog telephone transmission, FM theory, FM Detector theory, analog TV transmission, Digital transmission- base band and band pass transmission of digital data, BPSK, QPSK, PCM, Access techniques: FDMA, TDMA, CDMA, Encoding & FEC for Digital satellite links. | 12 |

**TEXT BOOKS/
REFERENCES**

1. Satellite communication, Timothy Pratt, Charles W. Bostian, John Wiley & sons, Publication, 2003 .
2. Digital Satellite Communications, Tri T. Ha, 2nd Edition, Tata McGraw Hill
3. Satellite Communication, Dennis Roddy, 4th Edition, Mc Graw Hill International, 2006
4. Satellite Communication Systems Engineering, Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, Prentice Hall/Pearson, 2007
5. The Satellite Communication Applications, Bruce R. Elbert, Hand Book, Artech House Bostan London, 1997.

