Electronics and Communication Engineering

Scheme and Syllabus (With effect from 2020-21 admitted batch)

B.Tech I Year - I Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
EC-1101	BS	Maths – I	3	0	0	30	70	100	3
EC-1102	BS	Physics	3	0	0	30	70	100	3
EC-1103	ES	Engg .Graphics	1	0	4	30	70	100	3
EC-1104	ES	Electronic Devices and Circuits	3	0	0	30	70	100	3
EC-1105	ES	Network Theory Analysis	3	0	0	30	70	100	3
EC-1106	ES	Workshop Lab	0	0	3	50	50	100	1.5
EC-1107	BS	Physics Lab	0	0	3	50	50	100	1.5
EC-1108	ES	Electronic Devices and Circuits Lab	0	0	3	50	50	100	1.5
Total Credits									**19.5**

B.Tech I Year - II Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
EC-1201	BS	Maths – II	3	0	0	30	70	100	3
EC-1202	BS	Chemistry	3	0	0	30	70	100	3
EC-1203	HSS	English	3	0	0	30	70	100	3
EC-1204	ES	CPNM	3	0	3	30	70	100	3
EC-1205	ES	Switching Theory and Logic Design	3	0	0	30	70	100	3
EC-1206	HSS	English Language Lab	0	0	2	50	50	100	1.5
EC-1207	BS	Chemistry Lab	0	0	3	50	50	100	1.5
EC-1208	ES	CPNM Lab	0	0	3	50	50	100	1.5
Total Credits									**19.5**

EC-1101
MATHEMATICS-I

Course Objectives:

- To transmit the knowledge of Partial differentiation.
- To know of getting maxima and minima of function of two variables and finding errors and approximations.
- To evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- To expand a periodical function as Fourier series and half-range Fourier series.

Course Outcomes:

- Find the partial derivatives of functions of two or more variables.
- Evaluate maxima and minima, errors and approximations.
- Evaluate double and triple integrals, volumes of solids and area of curved surfaces.
- To expand a periodical function as Fourier series and half-range Fourier series.
- Have a fundamental understanding of Fourier series and be able to give Fourier expansions of a given function.

SYLLABUS

Partial Differentiation

Introduction - Functions of two or more variables - Partial derivatives - Homogeneous functions – Euler's theorem - Total derivative - Change of variables – Jacobins. Mean value Theorems (without proofs)

Applications of Partial Differentiation

Geometrical interpretation -Tangent plane and Normal to a surface -Taylor's theorem for functions of two variables - Errors and approximations -Total differential. Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers - Differentiation under the integral Sign - Leibnitz's rule.

Multiple Integrals

Introduction - Double Integrals - Change of Order of Integration - Double Integrals in Polar Coordinates - Triple Integrals - Change of Variables.

Multiple Integrals-Applications

Area enclosed by plane curves - Volumes of solids - Area of a curved surface - Calculation of Mass - Center of gravity - Moment of inertia - product of inertia – principal axes- Beta Function - Gamma Function - Relation between Beta and Gamma Functions. Error Function or Probability Integral.

Fourier Series

Introduction - Euler's Formulae - Conditions for a Fourier Expansion - Functions having points of discontinuity - Change of Interval - Odd and Even Functions - Expansions of Odd or Even Periodic Functions, Half-Range Series - Parseval's Formula. Practical Harmonic analysis.

TEXT BOOK:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43rd Edition, Khanna publishers.

REFERENCE BOOKS:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K.International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Higher Engineering Mathematics by Dr. M.K.Venkataraman.

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EC-1102
PHYSICS

Course Objectives:

- To impart knowledge in basic concept of physics of Thermodynamics relevant to engineering applications.
- To grasp the concepts of physics for electromagnetism and its application to engineering. Learn production of Ultrasonics and their applications in engineering.
- To Develop understanding of interference, diffraction and polarization: connect it to a few engineering applications.
- To Learn basics of lasers and optical fibers and their use in some applications.
- To Understand concepts and principles in quantum mechanics and Nanopahse Materials. Relate them to some applications.
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Course Outcomes:

- Understand the fundamentals of Thermodynamics and Laws of thermodynamics. Understand the working of Carnot cycle and concept of entropy.
- Gain Knowledge on the basic concepts of electric and magnetic fields. Understand the concept of the nature of magnetic materials. Gain knowledge on electromagnetic induction and its applications .
- Understand the Theory of Superposition of waves. Understand the formation of Newton's rings and the working of Michelson's interferometer. Remember the basics of diffraction, Evaluate the path difference. Analysis of Fraunhofer Diffraction due to a single slit
- Understand the interaction of matter with radiation, Characteristics of Lasers, Principle, working schemes of Laser and Principle of Optical Fiber. Realize their role in optical fiber communication.
- Understand the intuitive ideas of the Quantum physics and understand dual nature of matter. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent one Dimensional Schrodinger's wave equation. Understand the fundamentals and synthesis processes of Nanophase materials.

SYLLABUS

THERMODYNAMICS

Introduction, Heat and Work, First law of thermodynamics and applications, Reversible and Irreversible process, Carnot cycle and Efficiency, Second law of thermodynamics, Carnot's Theorem, Entropy, Second law in terms of entropy, Entropy and disorder, Third law of thermodynamics (statement only).

ELECTROMAGNETISM

Concept of electric flux, Gauss's law - some applications, Magnetic field - Magnetic force on current, torque on current loop, The Biot-Savart's Law, B near a long wire, B for a circular Current loop, Ampere's law, B for a solenoid, Hall effect, Faraday's law of induction, Lenz's

law, Induced magnetic fields, Displacement current, Maxwell's equations (no derivation), Magnetic materials: Classification of magnetic materials and properties.

Ultrasonics : Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, acoustic grating, applications of ultrasonics.

OPTICS

Interference: Principles of superposition – Young's Experiment – Coherence - Interference in thin films (reflected light), Newton's Rings, Michelson Interferometer and its applications.

Diffraction: Introduction, Differences between interference and diffraction, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction at a single slit **(**Qualitative and quantitative treatment**)**.

Polarisation: Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization.

LASERS and FIBRE OPTICS

Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, Semiconductor laser, applications of lasers

Introduction to optical fibers, principle of propagation of light in optical fibers, Acceptance Angle and cone of a fibre, Numerical aperture, Modes of propagations, classification of fibers, Fibre optics in communications, Application of optical fibers.

MODERN PHYSICS

Introduction, De Broglie concept of matter waves, Heisenberg uncertainty principle, Schrodinger time independent wave equation, application to a particle in a box. Free electron theory of metals, Kronig - Penney model (qualitative treatment), Origin of energy band formation in solids, Classification of materials into conductors, semi conductors and insulators.

Nanophase Materials

Introduction, properties, Top-down and bottom up approaches, Synthesis - Ball milling, Chemical vapour deposition method , sol-gel methods, Applications of nano materials.

TEXT BOOKS :

1. Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand
3. Engineering Physics by R.K. Gaur and S.L. Gupta –Dhanpat Rai

Reference Books:

1. Modern Engineering Physics by A.S. Vadudeva
2. University Physics by Young and Freedman

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EC-1103
ENGINEERING GRAPHICS

Course Objectives:

- Understand the basics of Engineering Graphics and BIS conventions.
- Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings
- Demonstrate and practice the various profiles/curves used in engineering practice through standard procedures.
- Demonstrate and practice the orthographic projections of points, lines, planes, solids and section of solids
- Demonstrate and practice the development of surfaces of simple solids
- Familiarize the basic concept of isometric views clearly.

Course Outcomes:

- Develop simple engineering drawings by considering BIS standards.
- Able to draw different engineering curves with standard Procedures
- Comprehend the basics of orthographic projections and deduce orthographic projections of points, lines, planes and solids at different orientations in real life environment.
- Visualize clearly the sections of solids.
- Apply the concepts of development of surfaces while designing/analyzing any product.
- Recognize the significance of isometric drawing to relate 2D environment with 3D environment.

SYLLABUS

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions, and Scales.
Curves: Conic sections: General construction of ellipse, parabola and hyperbola. Construction of involutes of circle and polygons only. Normal and tangent to curves.

Projections of Points: Principal or Reference Planes, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane.

Projections of Straight Line Inclined to Both the Reference Planes: Projections of Planes: Projection of Perpendicular planes: Perpendicular to both reference planes, perpendicular to one reference plane and parallel to other reference plane and perpendicular to one reference plane and inclined to other reference plane. Projection of Oblique planes. Introduction to Auxiliary Planes.

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane

and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to other and axes inclined to both the reference planes.

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids (Prism, Pyramid, Cylinder and Cone) in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Isometric Views: Isometric projection, Isometric scale and Isometric view. Isometric view of Prisms, Pyramids, cylinder, cone, and their combinations.

Text Book:
Elementary Engineering Drawing by N.D.Bhatt, Charotar Publishing House.

Reference:
Engineering Graphics by K.L. Narayana and P. Kannaiah, Tata Mc-Graw Hill

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EC-1104
ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

- The principles of Electronics Engineering.
- The operation of semiconductor devices.
- DC analysis and AC models of semiconductor devices.
- How to apply concepts for the design of Filters, Regulators, Oscillators and Amplifiers for different applications.
- The theoretical concepts through laboratory and simulation experiments.
- How to implement mini projects using electronic circuit concepts.

Course Outcomes:

- State the operating principles of major electronic devices and circuit models.
- Analyze dc circuits and relate ac models of semiconductor devices with practical Operation.
- Design and analyze electronic circuits.
- Apply this knowledge to the analysis and design of basic circuits.

SYLLABUS

Energy band theory of solids and transport phenomenon in semiconductors

Energy Band Theory of Solids Intrinsic and Extrinsic Semiconductors Doping, Doping Materials, Carrier Mobility, Conductivity, Diffusion and continuity equation, Hall – Effect and its Application.

Junction diode characteristics

Semiconductor Diodes Band structure of PN Junction, Quantitative Theory of PN Diode, Volt – Amp. Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction, Zener and Avalanche Breakdowns, Tunnel Diode, LED, Schottky Barrier Diode, Varactor Diode, Photo Diode, PIN Diode, Point Contact Diode.

Rectifier Circuits

Diode Rectifiers Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics.

Transistor characteristics and transistor biasing

Bipolar Junction Transistor NPN and PNP junction Transistor, Characteristics of Current Flow across the Base Regions, Minority and Majority Carrier Profiles, CB, CE and CC Configurations and their Input and Output Characteristics. Comparison of CE, CB and CC Configurations. Junction Biasing for Saturation, Cutoff and Active Region, α and β Parameters and the relation between them, Photo Transistor, various Biasing circuits, stabilizations, thermal runaway, thermal stability, Transistor series and shunt voltage regulators.

Field effect transistors

JFET JFET and its characteristics, Pinch off Voltage, Drain Saturation Current, JFET biasing, MOSFET –Enhancement and Depletion Modes, Small signal models of FET.

The transistor at low frequencies

Small Signal – Low Frequency Transistor Amplifier Circuits Transistor as an Amplifier, h – parameter model, Analysis of Transistor Amplifier Circuits using h –parameters. CB, CE and CC Amplifier configurations and performance factors. Analysis of Single Stage Amplifier, RC Coupled Amplifiers. Effects of Bypass and Coupling Capacitors. Frequency Response of CE Amplifier, Emitter – Follower, Cascaded Amplifier.

Text Books:

1. Integrated Electronics, Analog Digital Circuits and systems, Jacob Millman and D. Halkias, McGraw Hill.

2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.

Reference Books:

1. Electronic Devices and Circuits 2nd Edition, B. V. Rao and K. Raja Rajeswari, Pearson Education

2. Electronic Devices and Circuits, K. Venkat Rao, K. Rama Sudha, McGraw Hill education, Edition-2015.

3. Electronic Devices and Circuits Theory, Boylsted and Nashelsky, Prentice Hall Publications.

EC-1105
NETWORK THEORY ANALYSIS

Course Objectives:

- The Principles of Electrical Network Analysis.
- The basic concepts and laws of DC and AC electrical networks and solve them using mesh and nodal analysis techniques.
- How to analyze circuits in time and frequency domain.
- The concepts of open circuit, short circuit, transmission, hybrid parameters and their interrelationship.
- How to synthesize the network using passive elements.

Course Outcomes:

- Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems.
- Apply time and frequency concepts of analysis.
- Synthesize the network using passive elements.
- Distinguish various parameters and their interrelationship.
- Solve numerical problems with series, parallel and cascade connections using two port networks.
- Analyze and design simple electrical networks.

SYLLABUS

Analysis of DC Circuits

Active elements, Passive elements, Reference directions for current and voltage, Kirchoffs Laws, Voltage and Current Division Nodal Analysis, Mesh analysis, Linearity and superposition, Thevinin's theorem and Norton's theorem, Reciprocity theorem, Z,Y,H,Sparameters.

DC transients

Inductor, Capacitor, source free RL, RC and RLC response, Evaluation of Initial conditions, Application of unit-step function to RL, RC and RLC circuits, concepts of Natural, Forced and Complete response.

Sinusoidal Steady State Analysis

The sinusoidal forcing function, Phasor Concept, Average and Effective value of Voltage and Current, instantaneous and Average Power, Complex Power, Steady State Analysis using mesh and node analysis, application of network theorems to AC circuits, resonance, Concept of Duality.

Network functions

Network functions for single port and two port, Calculation of Network functions for Ladder and General Networks, Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and Transfer functions, Time Domain Behavior from Pole Zero plot, Transfer Functions in terms of Y and Z functions, Scaling Network Functions.

Positive Real Functions

Positive real function and other properties, Herwitz polynomials, Computation of residues, even and Odd functions, Test for Positive Real Functions.

Text Books:

1. Engineering Circuit Analysis, William H.Hayt Jr. and Jack E. Kemmerley, 5thEdition, McGraw Hill International Edition.
2. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI.
3. Modern Network Synthesis, M. E. Van Valkenburg, Wiley Eastern.

EC-1106
WORKSHOP LAB

Course Objectives:

- Get hands on experience with the working skills in Carpentry trade.
- Know how to work with Sheet Metal tools.
- Get familiar with the working skills of Metal Fitting operations.
- Get hands on experience with house hold electrical wiring.

Course Outcomes:

- Can be able to work with Wood Materials in real time applications.
- Can be able to build various parts with Sheet Metal in day-to-day life.
- Can be able to apply Metal Fitting skills in various applications.
- Can be able to apply this knowledge to basic house electrical wiring and repairs.

SYLLABUS

Carpentry: Any three jobs from – Half lap joint, Mortise and Tenon joint, Half – lap Dovetail joint, Corner Dovetail joint, Central Bridle joint.
Sheet Metal: Any three jobs from – Square tray, Taper tray(sides), Funnel, Elbow pipe joint.
Fitting: Any three jobs from – Square, Hexagon, Rectangular fit, Circular fit and Triangular fit.
House wiring: Any three jobs from – Tube light wiring, Ceiling fan wiring, Stair-case wiring, Corridor wiring.

References:

1. Elements of workshop technology, Vol.1 by S. K. and H. K. Choudary.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.

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EC-1107
PHYSICS LAB

Course Objectives:

- To enable the students to acquire skill, technique and utilization of the Instruments
- Draw the relevance between the theoretical knowledge and to imply it in a practical manner with respect to analyze various electronic circuits and its components.
- To impart the practical knowledge in basic concepts of Wave optics, Lasers and Fiber optics.
- To familiarize the handling of basic physical apparatus like Vernier callipers, screw gauge, spectrometers, travelling microscope, laser device, optical fibre, etc.

Course Outcomes:

- Ability to design and conduct experiments as well as to analyze and interpret
- Ability to apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics
- The student will learn to draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.

SYLLABUS

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray μ_o and Extraordinary μ_e ray.
6. Determination of Thickness Given Paper Strip by Wedge Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination Of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Laser- Diffraction.

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EC-1108
ELECTRONIC DEVICES AND CIRCUITS LAB

Course Objectives:

- Study semiconductor diodes, verify their characteristics and applications of diodes as regulators, rectifiers.
- Measure the V-I characteristics of various devices that are used in the electronic equipment.
- Verify functionality through V-I characteristics of active devices like BJT, JFET, MOSFETS and their applications.

Course Outcomes:

- Comprehend the depth of semiconductor devices like diodes, transistor, JFET, MOSFETs characteristics.
- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Gain hands on experience in handling electronic components and devices.
- Study and verify various amplifier designs with calculation of impedance and band width.

LIST OF EXPERIMENTS

1. Study of CRO and Applications
2. V-I Characteristics of PN Junction Diode
3. V-I Characteristics of Zener Diode and Zener regulator characteristics.
4. V-I Characteristics of LED
5. V-I characteristics of Photo diode
6. Half-wave and full-wave rectifiers
7. Half-wave and full-wave rectifiers with capacitor filter
8. CE characteristics of BJT, h-parameters
9. CB characteristics of BJT, h-parameters
10. Voltage gain, input impedance and output impedance of emitter follower
11. Drain and transfer characteristics of JFET
12. Frequency response of CE amplifier

EC-1201
MATHEMATICS – II

Course Objectives:

- The way of obtaining rank, eigen values and eigen vectors of a matrix.
- To know the importance of Cayley-Hamilton theorem and getting canonical form from a given quadratic form.
- To solve the system of equations by using direct and indirect methods.
- To solve first order and higher order differential equations by various methods.
- To obtain the Laplace transforms and inverse Laplace transforms for a given functions and their applications.

Course Outcomes:

- Find rank, eigen values and eigen vectors of a matrix and understand the importance of Cayley-Hamilton theorem.
- Reduce quadratic form to canonical forms and solving linear systems by direct and indirect methods.
- Demonstrate solutions to first order differential equations by various methods and solve basic applications problems related to electrical circuits, orthogonal trajectories and Newton's law of cooling
- Discriminate among the structure and procedure of solving higher order differential equations with constant and variable coefficients.
- Understand Laplace transforms and its properties and finding the solution of ordinary differential equations.

SYLLABUS

Linear Algebra

Rank of a matrix- Echelon form, Normal Form - Solution of Linear System of Equations - Consistency of Linear System of Equations - Direct & Indirect Methods: Gauss elimination method, LU Factorization method, Gauss Seidal Method. Complex Matrices: Hermitian, Skew-Hermitian and Unitary Matrices and their Properties.

Eigen Values and Eigen Vectors

Eigen Values and Eigen Vectors of a Matrix - Cayley-Hamilton theorem - Inverse and Powers of a Matrix using Cayley-Hamilton's theorem and its applications. Diagonalization of a Matrix - Quadratic Forms - Reduction of Quadratic Form to Canonical Form - Nature of a Quadratic Form.

Ordinary Differential Equations of First Order and its Applications

Formation of ordinary differential equations (ODEs) - Solution of an ordinary differential equation - Equations of the first order and first degree - Linear differential equation - Bernoulli's equation - Exact differential equations - Equations reducible to exact equations - Orthogonal Trajectories - Simple Electric (LR & CR) Circuits - Newton's Law of Cooling - Law of Natural growth and decay.

Differential Equations of Higher Order

Solutions of Linear Ordinary Differential Equations with Constant Coefficients - Rules for finding the complimentary function - Rules for finding the particular integral - Method of variation of parameters - Cauchy's linear equation - Legendre's linear equation - Simultaneous linear differential equations.

Laplace Transforms

Introduction - Existence Conditions - Transforms of Elementary Functions - Properties of Laplace Transforms - Transforms of Derivatives - Transforms of Integrals - Multiplication by t^n - Division by t – Evaluation of integrals by Laplace Transforms - Inverse Laplace Transform - Applications of Laplace Transforms to Ordinary Differential Equations - Simultaneous Linear Differential Equations with Constant Coefficients - Second Shifting Theorem - Laplace Transforms of Unit Step Function, Unit Impulse Function and Laplace Transforms of Periodic Functions.

TEXT BOOK:

Scope and Treatment as in "Higher Engineering Mathematics", by Dr. B.S. Grewal, 43r^d edition, Khanna publishers.

REFERENCE BOOKS:

1. Graduate Engineering Mathematics by V B Kumar Vatti., I.K. International publishing house Pvt. Ltd.
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics, by N.P. Bali and Dr. Manish Goyal. Lakshmi Publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.

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EC-1202
CHEMISTRY

Course Objectives:

- To apply the basic knowledge of Chemistry to the Engineering Discipline.
- To develop knowledge about water and its treatment for industrial and potable purposes.
- To develop understanding in the areas of Polymers, Mechanism of Corrosion of Metals and Corrosion Control Methods, Fuels, Lubricants and Nanomaterials for of conducting polymers, bio-degradable polymers and fiber reinforced plastics and apply the knowledge for solving existing challenges faced in various engineering and societal areas.

Course outcome:

- This course applies the basic concepts and principles studied in Chemistry to Engineering.
- It provides an application of chemistry to different branches of engineering
- The students will be able acquire knowledge in the areas of Water Chemistry,Polymers, Corrosion, Fuels and Lubricants and nanomaterials and suggest innovative solutions for existing challenges in these areas.

SYLLABUS

Water Chemistry

Sources of Water – Impurities and their influence of living systems – WHO Limits – Hardness and its Determination – Boiler Troubles and their removal – Water Softening Methods – Lime-Soda, Zeolite and Ion Exchange - Municipal Water Treatment-Break Point Chlorination – Desalination of Sea Water – Reverse Osmosis Method, Electro-dialysis.

Polymers and Plastics

Polymers: Definition – Types of Polymerization (Addition & Condensation) – Mechanisms of Addition Polymerization – Radical and Ionic – Thermodynamics of Polymerization Process.

Plastics: Thermosetting and Thermoplastics – Effect of Polymer Structure on Properties of Cellulose Derivatives – Vinyl Resins – Nylon (6,6), Reinforced Plastics – Conducting Polymers.

Corrosion

Corrosion: Origin and Theory – Types of Corrosion: Chemical and Electrochemical; Pitting, Inter granular, Waterline, Stress – Galvanic Series – Factors Effecting Corrosion.

Corrosion Controlling Methods: Protective Coatings: Metallic Coatings, Electroplating and Electroless Plating – Chemical conversion Coatings – Phosphate, Chromate, Anodized, Organic Coatings – Paints and Special Paints.

Fuels and Lubricants

Solid Fuels: Wood and Coal, Ranking of Coal – Analysis (Proximate and Ultimate) Coke Manufacture – Otto Hoffmann's Process – Applications; **Liquid Fuels:** Petroleum Refining – Motor Fuels – Petrol and Diesel Oil – Knocking – Octane number – Cetane Number; **Gaseous Fuels:** Biogas, LPG and CNG – Characteristics – Applications; **Rocket Fuels:** Propellants – Classification – Characteristics

Lubricants: Classification – Mechanism – Properties of Lubricating Oils – Selection of Lubricants for Engineering Applications.

Nanomaterials

Nanomaterials, Properties and application of fullerenes, fullerols, Carbon nanotubes and nanowires. Synthesis - Top-down and Bottom-up approaches - Nanocomposites - Nanoelectronics- Applications of nanomaterials in catalysis, telecommunication and medicine.

Text Books:

1. Engineering Chemistry – PC Jain and M. Jain – Dhanpath Rai and Sons, New Delhi.
2. A Text book of Engineering Chemistry – S. S. Dara – S. Chand & Co. New Delhi.

Reference Books:

1. Engineering Chemistry – B. K. Sharma – Krishna Prakashan – Meerut.
2. Introduction to Nanoscience - S. M. Lindsay - Oxford University Press
3. Engineering Chemistry - B. L. Tembe, Kamaluddin and M. S. Krishnan, (NPTEL).

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EC-1203
ENGLISH

Course Objectives:

- To make students understand the explicit and implicit meanings of a text/topic;
- To give exposure to new words and phrases, and aid to use them in different contexts;
- To apply relevant writing formats to draft essays, letters, emails and presentations; and
- To adapt oneself to a given situation and develop a functional approach to finding solutions: adaptability and problem solving.

Course Outcomes:

- Students will be able to analyse a given text and discover the various aspects related to language and literature;
- Learn the various language structures, parts of speech and figures of speech;
- Develop one's reading and writing abilities for enhanced communication; and
- Learn to apply the topics in real-life situations for creative and critical use.

SYLLABUS

On the conduct of life: William Hazlitt
Life skills: Values and Ethics
If: Rudyard Kipling

The Brook: Alfred Tennyson
Life skills: Self-Improvement
How I Became a Public Speaker: George Bernard Shaw

The Death Trap: Saki
Life skills: Time Management
On saving Time: Seneca

Chindu Yellama
Life skills: Innovation
Muhammad Yunus

Politics and the English Language: George Orwell
Life skills: Motivation
Dancer with a White Parasol: Ranjana Dave

Grammar:

Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement – Misplaced Modifiers – Clichés, Redundancies.

Vocabulary:

Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes – Synonyms, Antonyms – Common Abbreviations

Writing:

Clauses and Sentences – Punctuation – Principals of Good Writing – Essay Writing – Writing a Summary

Writing: Essay Writing

Life skills: Innovation

Muhammad Yunus

Textbook: *Language and Life: A Skills Approach* Board of Editors, Orient Blackswan Publishers, India. 2018.

References :

1. *Practical English Usage*, Michael Swan. OUP. 1995.
2. *Remedial English Grammar*, F.T. Wood. Macmillan.2007
3. *On Writing Well*, William Zinsser. Harper Resource Book. 2001
4. *Study Writing*, Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. *Communication Skills*, Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6. *Exercises in Spoken English*, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

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EC-1204
CPNM

Course Objectives:

- The course is designed to provide complete knowledge of C language.
- To provide students with understanding of code organization and functional hierarchical decomposition with using complex data types.
- To provide knowledge to the Students to develop logics which will help them to create programs, applications in C.
- This course aims to identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.
- This course provides the fundamental knowledge which is useful in understanding the other programming languages.

Course Outcomes:

- **Identify** basic elements of C programming structures like data types, expressions, control statements, various simple functions and **Apply** them in problem solving.
- **Apply** various operations on derived data types like arrays and strings in problem **solving**.
- **Design** and Implement of modular Programming and memory management using Functions, pointers.
- **Apply** Structure, Unions and File handling techniques to **Design** and **Solve** different engineering programs with minimal complexity.
- **Apply** Numerical methods to **Solve** the complex Engineering problems.

SYLLABUS

1. Introduction to C: Basic structure of C program, Constants, Variables and data types, Operators and Expressions, Arithmetic Precedence and associativity, Type Conversions. Managing Input and Output Operations Formatted Input, Formatted Output.

2. Decision Making, Branching, Looping, Arrays & Strings: Decision making with if statement, Simple if statement, The if…else statement, Nesting of if…else statement, the else..if ladder, switch statement, the (?:) operator, the GOTO statement., The while statement, the do statement, The for statement, Jumps in Loops ,One, Two-dimensional Arrays, Character Arrays. Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings.

3. Functions: Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return Values, Arguments with Return Values, No Argument but Returns a Value, Functions that Return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, the scope, visibility and lifetime of variables.

4. Pointers: Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointes, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures-Program Applications

5. Structure and Unions: Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, arrays within structures, structures within structures, structures and functions and unions, size of structures and bit-fields- Program applications.

6. File handling: Defining and opening a file, closing a file, Input/ Output operations on files, Error handling during I/O operations, random access to files and Command Line Arguments-Program Applications

7. Numerical Methods: Solutions of Algebraic and Transcendental Equations, Bisection Method, Newton Raphson Method. Newton's forward and backward Interpolation, Lagrange's Interpolation in unequal intervals. Numerical Integration: Trapezoidal rule, Simpson's 1/3 rules. Solutions of Ordinary First Order Differential Equations: Euler's Method, Modified Euler's Method and Runge-Kutta Method.

Text Book:

1. Programming in ANSI C, E Balagurusamy, 6th Edition. McGraw Hill Education (India) Private Limited.
2. Introduction to Numerical Methods, SS Sastry, Prentice Hall

Reference Books:

1. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, " 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI.
4. Scientific Programming: C-Language, Algorithms and Models in Science, Luciano M. Barone (Author), Enzo Marinari (Author), Giovanni Organtini, World Scientific.

EC-1205

SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

- Different number systems, digital logic, simplification and minimization of Boolean functions.
- How to analyze logic processes and implement logical operations using combinational logic circuits.
- The characteristics of memory and their classification.
- How to design combinational & sequential digital circuits and state machines.
- About programmable logic devices.

Course Outcomes:

- Analyze, design and implement combinational logic circuits.
- Analyze, design and implement sequential logic circuits.
- Develop a digital logic and apply it to solve real life problems.

SYLLABUS

Number systems and codes

Number systems, Base conversion methods, Complement of numbers, Codes: Binary, Non binary, Decimal, Alphanumeric, Gray, Error detecting and error correcting codes. Logic Gates: AND, OR, NOT, NAND, NOR, XOR, EX-NOR and Universal Gates

Minimization of Boolean Functions

Fundamental postulates of Boolean algebra, Basic theorems, Simplification of Boolean equations, Min terms, Max terms, Standard form of Boolean functions. Simplification of functions: Karnaugh map method and Quine-McClusky methods (up to six variables), Multiple Output functions, incomplete specified functions.

Combinational Logic-Circuit Design-1

Logic design of combinational circuits: Adders and Subtractors: Binary, BCD, Excess -3 and Look –ahead-carry adder, Code converters, Multiplexers, De multiplexers, Encoders, Decoders and priority encoders, Realization of Boolean functions using multiplexers, De multiplexers and Decoders.

Combinational Logic-Circuit Design-I1

Design of 4-bit comparator, Parity checker/Generator, Seven segment decoders, Hazards in combinational circuits, Hazard free realizations. Basics of PLDs: Basic structure of PROM, PAL, PLA, CPLD, FPGAs, Realization of Boolean functions with PLDs and their merits and demerits.

Sequential circuits

Classification of sequential circuits, SR-latch, Gated latches, Flip flops: RS, JK, D, T and Master slave flip flops, Excitation tables, flip flop conversion from one type to another. Design of counters: Ripple counters, Synchronous counters, asynchronous counters, up-down counters, Johnson counter, ring counter. Design of registers: Buffer registers, Shift registers, Bi directional shift registers, Universal shift register

Analysis and design of finite state machines

State assignment, State tables, Equivalent states, Elimination of Redundant states, Determination of state equivalence, Reduction using implication table, reducing incompletely specified state tables.

Text Books:

1. Switching and finite Automatic theory, ZuiKohari, TMH

2. Switching theory and logic design by Frederick.J.Hill and Gerald.R.Peterson

3. Switching theory and logic design, Anandakumar, PHI.

Reference Books:

1. Fundamentals of Logic Design, Charles.R.Roth, Thomson Publications.

2. Digital Design by Morries Mono, PHI. ECE:

EC-1206
ENGLISH LANGUAGE LAB

Course Objectives:

- To make students recognize the sounds of English through Audio-Visual aids;
- To help students build their confidence and help them to overcome their inhibitions and self-consciousness while speaking in English;
- To familiarize the students with stress and intonation and enable them to speak English effectively; and
- To give learners exposure to and practice in speaking in both formal and informal contexts.

Course Outcomes:

- Students will be sensitized towards recognition of English sound patterns and the fluency in their speech will be enhanced;
- A study of the communicative items in the laboratory will help students become successful in the competitive world;
- Students will be able to participate in group activities like roleplays, group discussions and debates; and
- Students will be able to express themselves fluently and accurately in social as well professional context.

SYLLABUS

Introduction to Phonetics: The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhythm.

Listening Skills: Listening for gist and specific information - listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

Speaking Skills: Self-introduction - Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

Reading and Writing skills: Reading Comprehension – Précis Writing - E-Mail writing - Punctuation.

Presentation skills: Verbal and non-verbal communication - Body Language - Making a Presentation.

Reference Books:

1. Ashraf Rizvi. *Effective Technical Communication*. Tata McGraw Hill Education Private Limited, New Delhi.
2. *Speak Well*. Orient Blackswan Publishers, Hyderabad.
3. Allan Pease. *Body Language*. Manjul Publishing House, New Delhi.

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EC-1207
CHEMISTRY LAB

Course Objectives:

- To develop the fine skills of quantitative determination of various chemical components through titrimetric analysis
- To prepare and use ionexchange/ zeolite columns for the removal of hardness of water
- To develop the skill of organic synthesis through the preparation of a polymer/ drug

Course Outcomes:

- The course provides quantitative determine the amount of various chemical species in solutions by titrations and conduct the quantitative determinations with accuracy
- The course provides to develop novel materials to be used as zeolite and prepare columns for removal of hardness of water
- The course provides to synthesise a polymer or a drug

SYLLABUS

1. Determination of Sodium Hydroxide with HCl (Na_2CO_3 Primary Standard)
2. Determination of Alkalinity (Carbonate and Hydroxide) of water sample
3. Determination of Fe(II)/Mohr's Salt by Permanganometry
4. Determination of Oxalic Acid by Permanganometry
5. Determination of Chromium (VI) by Mohr's Salt Solution
6. Determination of Zinc by EDTA method
7. Determination of Hardness of Water sample by EDTA method
8. Determination of Chlorine in water by Iodometric Titration
9. Ionexchange/ Zeolite column for removal of hardness of water
10. Synthesis of Polymer/ drug

Reference Books:

1. Vogel's Quantitative Chemical Analysis – V – Edition – Longman.
2. Experiments in Applied Chemistry (For Engineering Students) – Sinita Rattan – S. K. Kataria & Sons, New Delhi

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EC-1208
CPNM LAB

Course Objectives:

- To impart writing skill of C programming to the students and solving problems.
- To write and execute programs in C to solve problems such as Modularize the problems into small modules and then convert them into programs.,
- To write and execute programs in C to solve problems such as arrays, files, strings, structures and different numerical methods.
- This reference has been prepared for the beginners to help them understand the basic to advanced concepts related to Objective-C Programming languages.

Course Outcomes:

- Understand various computer components, Installation of software. C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
- Construct programs that demonstrate effective use of C features including arrays, strings, structures, pointers and files.
- Apply and practice logical ability to solve the real world problems.
- Apply Numerical methods to Solve the complex Engineering problems.

SYLLABUS

1. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while, and do while).
3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position, Copying one string to another, Reversing a string, adding one string to another.
4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float, and double. What happens when you add 1 to the largest possible integer number that can be stored?
5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.
6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).
7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.
8. Given two points on the surface of the sphere, write a program to determine the smallest arc length between them.

9. Implement bisection method to find the square root of a given number to a given accuracy.
10. Implement Newton Raphson method to det. a root of polynomial equation.
11. Given table of x and corresponding f(x) values, Write a program which will determine f(x) value at an intermediate x value by using Lagrange's interpolation/
12. Write a function which will invert a matrix.
13. Implement Simpson's rule for numerical integration.
14. Write a program to solve a set of linear algebraic equations.

II/IV B.TECH ECE (FOUR YEAR COURSE) &
II/IV B.TECH + M.TECH (SIX YEAR DUAL DEGREE COURSE)
(WITH EFFECT FORM 2020-2021 ADMITTED BATCH ONWARDS)
B.Tech & B.Tech+M.Tech
II Year - I Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
EC-2101	BS	Mathematics III	3	0	0	30	70	100	3
EC-2102	PC	Analog Electronic Circuits	3	0	0	30	70	100	3
EC-2103	PC	Electrical Machines	3	0	0	30	70	100	3
EC-2104	PC	Signals & Systems	3	0	0	30	70	100	3
EC-2105	HSS	Managerial Economics	3	0	0	30	70	100	3
EC-2106	PC	Networks and Machine Lab	0	0	3	50	50	100	1.5
EC-2107	PC	Analog Electronics and Circuits Lab with Simulation	0	0	3	50	50	100	1.5
EC-2108	PC	Digital ICs and HDL Lab	0	0	3	50	50	100	1.5
EC-2109	SC	Matlab Programming	1	0	2	50	50	100	2
EC-2110	MC	Professional Ethics& Universal Human values	0	0	0	----	100	100	0
EC-2111	MC	NCC/NSS	0	0	2	----	----	-----	0
Total Credits									**21.5**

B.Tech & B.Tech+M.Tech
II Year - II Semester

Course code	Category	Course Title	Hours per week			Internal Marks	External Marks	Total Marks	Credits C
			L	T	P				
EC-2201	ES	MIV	3	0	0	30	70	100	3
EC-2202	BS/PC	Electromagnetic Field Theory and Transmission Lines	3	0	0	30	70	100	3
EC-2203	PC	Microprocessors and Microcontrollers	3	0	0	30	70	100	3
EC-2204	PC	Probability theory and Random Process	3	0	0	30	70	100	3
EC-2205	PC	Analog Communications	3	0	0	30	70	100	3
EC-2206	PC	Microprocessors & Microcontrollers Lab	0	0	3	50	50	100	1.5
EC-2207	PC	Analog Communications Lab	0	0	3	50	50	100	1.5
EC-2208	SC	Python Programming	1	0	2	50	50	100	2
EC-2209	MC	Environmental Science	0	0	0	------	100	100	0
Total Credits									**20**

Summer Internship(Community Service)

EC-2101
MATHEMATICS-III
B.Tech & B.Tech+M.Tech
II Year - I Semester

(With effect from the admitted batch of 2020-2021)

Subject Code: **External Examination - Max. Marks: 70**
No. of Credits: 3 **Internal Examination - Max. Marks: 30**
No. of Periods/ Week: 3 **Total Marks: 100**

OBJECTIVES:

In general, the students are introduced with a knowledge on the topics: Vector Calculus, Partial differential equations, their applications and Integral Transforms (Fourier transforms, FST, FCT) so as to facilitate them to use these concepts in core subjects.

The objectives, in particular are to learn:

- the basic knowledge and applications of Vector Calculus used in Engineering problems.
- About the gradient, divergence and curl under the differentiation of scalar and vector point functions, also on Line-, Surface- and Volume integrals under the integration of point functions along with their applications in Engineering issues.
- Transformation theorems such as **Green's** theorem in the plane, **Stoke's** theorem, **Gauss Divergence** theorem and their applications.
- How to formulate the Partial Differential Equations from the relation between the dependent and independent variables, the methods of solving first order first degree linear, non-linear P**artial Differential Equations**, Homogeneous and Non homogeneous linear partial differential equations with constant coefficients .
- The procedure to find out the solutions of Partial Differential Equations by using the method of separation of variables (product method) about the formulation of one dimensional wave (string equation), one-and two-dimensional **Heat flow equations**, **Laplace's equation** in Cartesian and polar coordinates, and how to solve these equations using the method of separation of variables.
- The concept of integral transforms, namely, **Fourier transforms**, **Fourier Sine, Cosine and related inverse transforms, and** their applications in solving several Physical and Engineering problems.

Unit-I
(VECTOR CALCULUS-DIFFERENTIATION)

Differentiation of vectors, curves in space, velocity and acceleration, relative velocity and relative acceleration, scalar and vector point functions, vector operator ∇ applied to scalar point functions-gradient, ∇ applied to vector point functions- divergence and curl. Physical interpretation of gradient, divergence and culrl (i.e., ∇f, $\nabla.\overline{F}$, $\nabla\times\overline{F}$), Irrotational and Solenoidal fields, the relations obtained after ∇ applied twice to point functions, ∇ applied to products of two functions.

Unit-II

(VECTOR INTEGRATION)

Integration of vectors, line integral, circulation, work done, surface integral-flux, Green's theorem in the plane, Stoke's theorem, volume integral, Gauss Divergence theorem. (All theorems without proofs)
Introduction of orthogonal curvilinear coordinates, cylindrical and spherical polar coordinates

Unit-III

(PARTIAL DIFFERENTIAL EQUATIONS)

Formation of partial differential equations, solutions of partial differential equations- equations solvable by direct integration, linear equations of first order: Lagrange's Linear equation, non-linear equations of first order, Charpit's method. Homogeneous linear equations with constant coefficients- rules for finding the complementary function, rules for finding the particular integral (working procedure), non-homogeneous linear equations.

Unit-IV

(APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS)

Method of separation of variables, One dimensional wave equation-vibrations of a stretched string, one dimensional Heat flow equation, Two dimensional heat flow in steady state - solution of Laplace's equation in Cartesian and polar coordinates (two dimensional).

Unit-V

(INTEGRAL TRANSFORMS (Fourier Transform)

Introduction, definition, Fourier integral, Sine and Cosine integrals, Complex form of Fourier integral, Fourier transform, Fourier Sine and Cosine transforms, Finite Fourier Sine and Cosine transforms, properties of Fourier transforms.
Convolution theorem for Fourier transforms, Parseval's identity for Fourier transforms, Fourier transforms of the derivatives of a function, simple applications to Boundary value problems.

TEXT BOOKS:

Scope and treatment as in "Higher Engineering Mathematics", by Dr. B.S.Grewal, **43rd Edition**, Khanna Publishers.

REFERENCE BOOKS:

1. Graduate Engineering Mathematics by V B Kumar Vatti, I.K.International publications
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics by N.P. Bali and Dr. Manish Goyal, Lakshmi Publications.
4. Mathematical Methods of Science & Engineering aided with MATLAB by Kanti B.Dutta, Cengage Learning India Pvt. Ltd.
5. Higher Engineering Mathematics by B. V. Ramana, Tata McGraw Hill Company.
6. Advanced Engineering Mathematics by H.K.Dass. S.Chand Company.

OUTCOMES: After going through this course , the students would be able to:

- operate the differential operator 'del' to the scalar and vector point functions, Calculate the Gradient, Divergence and Curl, Vector normal to a surface, maximum rate of change of a scalar field, test whether two surfaces are to cut orthogonally or not .
- find the rate per unit volume at which the physical quantity is issuing from a point, the rate of inflow minus out flow using the Divergence and the angular velocity of rotation at any point of the vector field using the Curl.
- **test** whether the given motion is irrotational or rotational, whether a vector force acting on a particle is conservative or not

- find out the potential function from a given vector field.
- obtain the well known Laplace and poisson equations from an irrotational field
- understand to determine the work done by a force field and circulation using a Line integral
- find out the Line, Surface and Volume integrals, find flux using surface integral and volumes using the volume integral.
- apply the vector integral theorems (Green's theorem in the plane, Stoke's and Divergence theorems) for evaluating the double and triple integrals as these are used to find areas and volumes.
- know the methods of solving Linear and Non linear first order and first degree partial differential equations.
- solve the Linear Partial Differential Equations with constant coefficients (homogeneous and non homogeneous) and know the procedure for finding the complementary function and particular integrals
- apply the method of separation of variables to obtain solutions to the boundary value problems involving Linear partial differential equations occurred in engineering studies
- solve wave equation, heat flow equation and the Laplace's equations in Cartesian and polar coordinates using the method of separation of variables.
- apply and extend the knowledge of Fourier transform techniques in solving several Initial and Boundary value problems of Engineering, such as in Conduction of heat / Thermodynamics, Hydraulics transverse vibrations of a string, oscillations of an elastic beam, bending of beams, electrical circuits, free and forced vibrations of a membrane and transmission lines , etc.

EC - 2102
ANALOG ELECTRONICS CIRCUITS

Course Objectives:

- To prepare students to perform the analysis of any Analog electronics circuit.
- To empower students to understand the design and working of BJT / FET.
- To empower students to understand the design and working of amplifiers and oscillators.
- To empower students to understand the design and working of Operational Amplifier.
- To prepare the students for advanced courses in Communication system Circuit Design.

Course Outcomes:

- Acquire basic knowledge of physical and electrical conducting properties of semiconductors.
- Develop the Ability to understand the design and working of BJT / FET amplifiers and Operational Amplifier.
- Develop the Ability to understand the design and working of BJT / FET oscillators.
- Develop the Ability to understand the design and working of Communication system Circuit Design.

SYLLABUS

Small Signal High Frequency Transistor Amplifier models

BJT: Transistor at high frequencies, Hybrid- common emitter transistor model, Hybrid- conductance's, Hybrid-capacitances, validity of Hybrid- model, determination of high frequency parameters in terms of low frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common source and common drain amplifier circuits at high frequencies.

Multistage Amplifiers

BJT and FET RC Coupled Amplifiers – Frequency Response. Cascaded Amplifiers. Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product.

Feedback Amplifiers

Concept of Feedback Amplifiers – Effect of Negative feedback on the amplifier Characteristics. Four Feedback Amplifier Topologies. Method of Analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.

Sinusoidal Oscillators

Condition for oscillations –LC Oscillators – Hartley, Colpitts, Clapp and Tuned Collector Oscillators – Frequency and amplitude Stability of Oscillators – Crystal Oscillators – RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

Power Amplifiers

Classification of Power Amplifiers – Class A, Class B and Class AB power Amplifiers. Series Fed, Single Ended Transformer Coupled and Push Pull Class A and Class B Power Amplifiers. Cross-over Distortion in Pure Class B Power Amplifier, Class AB Power Amplifier – Complementary Push Pull Amplifier, Derating Factor – Heat Sinks.

Tuned Voltage Amplifiers

Single Tuned and Stagger Tuned Amplifiers – Analysis – Double Tuned Amplifier – Bandwidth Calculation.

Text Books :

1. Integrated Electronics, Analog Digital Circuits and systems, **Jacob Millman** and **D. Halkias**, McGraw Hill, 1972

2. Electronic Devices and Circuits by **Salivahanan, N.Suresh Kumar** and**A.Vallava Raj** TMH, 2nd Edition, 1998.

3. Electronic Circuit Analysis, **B.V.Rao**, **K.RajaRajeswari et.al**, Pearson Publishers

References:

1. Electronic Devices and Circuits, **G.S.N. Raju**, IK International Publications, New Delhi, 2006.

2. Electronic Devices and Circuits – **G.K.Mithal**, Khanna Publishers, 23rd Edition, 2004.

EC- 2103
ELECTRICAL MACHINES

Course Objectives:

- Study of DC machines.
- Study of Transformers
- To introduce the concepts of ideal synchronous machines and poly-phase induction machines.
- Applications which will be utilized in the electrical machines with its performance and theory of operation.

Course Outcomes:

- Explain the theory of ideal synchronous machines and, basic machine relation.
- Analyze and apply the concept of steady state analysis and electrical transients in single phase and poly phase machines.
- Evaluate the basic operation and performance of special machines and can select special machines for different purpose

SYLLABUS

DC MACHINES
Constructional Features, Function of Commutator, Induced EMF and Torque Expressions, Relationship Between Terminal Voltage and Induced EMF for Generator and Motoring Action, Different Types of Excitation and Performance Characteristics of Different Types of DC Machines, Starting and Speed Control of DC Motors, Losses and Efficiency, Efficiency by Direct Loading, Swinburne's Test and Hopkin's Test, Applications of DC Machines.

TRANSFORMERS
Constructional Details, EMF Equation, Equivalent Circuit, Voltage Regulation, Losses and Efficiency, Auto – Transformers, Instrument Transformers, Open/Short – Circuit Tests and Determination of Efficiency and Regulation.

THREE – PHASE INDUCTION MACHINES
Construction, Rotating Magnetic Field and 3ph Induction Motor, Power Flow Diagram, Torque and Torque-slip Characteristics, Condition for Max. Torque and its Value, Starting and Speed Control, Losses and Efficiency, Equivalent Circuit and Circle Diagram of Induction Motor, No – Load and Rotor – Blocked Tests and Efficiency and Torque – Speed Characteristics.

THREE – PHASE SYNCHRONOUS MACHINES
Generation of EMF, Constructional Details, Induced EMF, Synchronous Generator on No –Load and Load, Synchronous Impedance and Voltage Regulation. V – Curves and Inverted V – Curves, Synchronous Condenser, Starting of Synchronous Motors, Applications of Synchronous Machines.

SINGLE – PHASE MOTORS
Double Revolving Field Theory, Methods of Starting Single Phase Induction Motors, Universal Motor, Stepper Motor.

Text Books:
1. Electrical Machines, S. K. Bhattacharya, TMH Publications N. Delhi.
2. A First Course In Electrical Engineering, S. M. Tiwari, A. S. Binsaroor, Wheeler Publication.

EC-2104

Signals & Systems

Course Objectives:

- To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series.
- Fourier transforms and Laplace transforms.
- To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
- To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

Course Outcomes:

- Analyze the discrete time signals and system using different transform domain techniques.
- Design and implement LTI filters for filtering different real world signals.
- Develop different signal processing applications using DSP processor.

SYLLABUS

Introduction to signals and linear time Invariant systems

Continuous –Time and Discrete –Time signals, Signal Energy and Power, Periodic Signals, Even and odd Signals, continuous- Time complex Exponential and Sinusoidal Signals, Discrete –Time complex Exponential and Sinusoidal Signals, Periodicity Properties of Discrete –Time Complex Exponentials, The Unit Impulse and Unit step Functions, The Discrete- Time Unit Step and Unit Impulse Functions, The Continuous-Time Unit impulse and Unit step Sequence, Continuous –Time and Discrete –Time Systems, Interconnections of Systems, Basic System Properties, Discrete –Time LTI Systems: The Convolution Sum, The Representation of Continuous –Time Signals in terms of Impulses, The Commutative property, Casual LTI Systems Described by Differential and Difference Equations, Singularity Functions.

Fourier Series Representation of Periodic Signals

Introduction, Fourier Series Representation of continuous time Periodic Signals, convergence of the Fourier Series, Properties of continuous time Fourier Series, Fourier Series representation of discrete time periodic signals, Properties of discrete time Fourier Series.

Continuous and Discrete time Fourier Transform

Introduction, Representation of Aperiodic signals, The continuous time Fourier Transform, The Fourier Transform for periodic signals, Properties of the continuous time Fourier Transform, The convolution Property, Multiplication property, Systems characterized by linear constant-coefficient differential equations. Discrete time Fourier Transform, Representation of Aperiodic signals discrete time Fourier Transform, Fourier Transform for periodic signals, Properties of the Discrete time Fourier Transform, The convolution property, The multiplication property, Duality, Systems characterized by linear constant co-efficient differential equations.

Convolution and correlation of signals

System analysis by Convolution, Convolution as a superposition of impulse response, some Convolution relationships, Graphical interpretation of Convolution, Convolution of a function with a unit impulse,

Signal comparison, Correlation and Convolution, Some properties of correlation functions, Correlation functions for nonfinite energy signals, Detection of periodic signals in the presence of Noise by correlation, Determination of the waveform of a periodic signal masked by Noise, Extraction of a signal from Noise by filtering.

Laplace Transform

Introduction, The Laplace Transform, the region of convergence for Laplace Transforms, The Inverse Laplace Transform, Geometrical evaluation of the Fourier transform from the Pole-Zero plot, Properties of Laplace Transforms, The initial and Final value theorems, Analysis and characterization of LTI systems using the Laplace Transforms.

Sampling Theorem and Z-transform

Introduction, reconstruction of a signal from its samples using interpolation, The effect of Undersampling: aliasing, Discrete time processing of continuous time signals, sampling of Discrete time signals. The ZTransform, The Inverse Z-Transform, Geometrical evaluation of the Z-Transform from the Pole-Zero plot, Properties of Z-Transform, The initial theorems, some common Z-transform pairs, Analysis and characterization of LTI systems using the Z-Transforms, System function algebra and block diagram representation, The unilateral Z-Transform.

Textbooks:

1.Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, PHI, 2ndEdn.
2. Signals Systems and Communication, B. P. Lathi, BS Publication
3. Signals and Systems, K. Raja Rajeswari and B. V. Rao, Prentice Hall of India.

References:

1. Signals and Systems- Simon Haykin and Van Veen, Wiley 2ndEdn.
2. Signals and Systems – P.RameshBabu and R.AnandaNatarajan 3rdEdn.

EC-2105

Managerial Economics

Course Objectives:

- To integrate the concept of price and output decisions of firms under various market structure.
- The objective of this course is to impart the knowledge of economics as a subject and its importance while business.
- The business decisions are made scientifically on the basis of all available information.
- To familiarize the students with the basic concept of microeconomics.
- To understand the demand and supply analysis in business applications
- To familiarize with the production and cost structure under different stages of production.
- To understand the pricing and output decisions under various market structure.
- To understand and apply the various decision tools to understand the market structure.

Course Outcomes:

- To understand the concepts of cost, nature of production and its relationship to Business operations.
- To apply marginal analysis to the "firm" under different market conditions.
- To analyze the causes and consequences of different market conditions.
- To integrate the concept of price and output decisions of firms under various market structure.

SYLLABUS

Significance of Economics and Managerial Economics:

Economics: Definitions of Economics- Wealth, Welfare and Scarcity definition Classification of Economics- Micro and Micro Economics.

Managerial Economics: Definition, Nature and Scope of Managerial Economics, Differences between Economics and Managerial Economics, Main areas of Managerial Economics, Managerial Economics with other disciplines.

Demand Analysis : Demand - Definition, Meaning, Nature and types of demand, Demand function, Law of demand - Assumptions and limitations. Exceptional demand curve.
(Two periods)

Elasticity of demand - Definition, Measurement of elasticity, Types of Elasticity (Price, Income, Cross and Advertisement), Practical importance of Price elasticity of demand, Role of income elasticity in business decisions, Factors governing Price Elasticity of demand.

Demand Forecasting - Need for Demand forecasting, Factors governing demand forecasting, Methods of demand forecasting: Survey methods- Experts' opinion survey method and consumers Survey methods.

Utility Analysis: Utility- Meaning, Types of Economic Utilities, Cardinal and Ordinal Utility, Total Utility, Marginal Utility, The law of Diminishing Marginal Utility and its Limitations**.**

Theory of Production and Cost analysis:

Production - Meaning, Production function and its assumptions, use of production function in decision making; Law of Variable Proportions: three stages of the law.

Cost analysis - Nature of cost, Classification of costs - Fixed vs. Variable costs, Marginal cost, Controllable vs. Non - Controllable costs, Opportunity cost, Incremental vs. Sunk costs,
Explicit vs. Implicit costs, Replacement costs, Historical costs, Urgent vs. Postponable costs, Escapable vs. unavoidable costs, Economies and Diseconomies of scale.

Market Structures :
Definition of Market, Classification of markets; Salient features or conditions of different markets - Perfect Competition, Monopoly, Duopoly , Oligopoly, Importance of kinked demand curve ;Monopolistic Competition.

Pricing Analysis :
Pricing - Significance: Different Pricing methods- Cost plus pricing, Target pricing, Marginal cost pricing, Going -rate pricing, Average cost pricing, Peak load pricing , Pricing of joint Products, Pricing over the life cycle of a Product, Skimming pricing Penetration pricing, Mark- up and Mark- down pricing of retailers.

Business cycles, Inflation and Deflation:
Business cycles - Definition , Characteristics , Phases, Causes and Consequences; Measures to solve problems arising from Business cycles.

Inflation -Meaning, Types, Demand- pull and Cost push inflation, Effects of Inflation, Anti- inflationary measures.

Deflation- Meaning, Effects of Deflation, Control of Deflation, Choice between Inflation and Deflation.

Text Books:
1. Sankaran,S., **Managerial Economics,** Marghan Publications, 2015, Chennai.
2. Aryasri, A.R., **Managerial Economics and Financial Analysis,** MC Graw Hill Education, New Delhi,2015.
Reference Books:
1. Dwivedi, D.N., **Managerial Economics,** Vikhas Publishing House Pvt. Ltd. 6th Edition, New Delhi,2004.
2. Dewett, K.K., **Modern Economic Theory**, S.Chand & Company Ltd., New Delhi, 2005.

EC-2106

Networks and Machine Lab

Course Objectives:

- To verify Superposition Theorem
- To verify Reciprocity Theorem
- To verify Thevenin's Theorem
- To verify Ohm's law
- To verify Kirchhoff's law
- To verify no load and blocked rotor tests on 3-phase squirrel cage Induction motor
- To verify Open circuit test and short circuit test on 1-phase transformer

Course Outcomes:

- Understand the concepts of various theorems and open circuit and no load tests practically.

SYLLABUS

LIST OF EXPERIMENTS

I. NETWORK LAB EXPERIMENTS

1. Verification of Superposition Theorem
2. Verification of Reciprocity Theorem
3. Verification of Thevenin's Theorem
4. Calibration of UPF Wattmeter
5. Verification of Ohm's law
6. Verification of Kirchhoff's law

II. ELECTRICAL MACHINES LAB EXPERIMENTS

7. No load and blocked rotor tests on 3-phase squirrel cage Induction motor
8. Regulation of alternator by synchronous Impedance method
9. Open circuit test and short circuit test on 1-phase transformer
10. Swin burner's test
11. No load and load characteristics of self-excited Shunt generator

EC-2107
Analog Electronics and Circuits Lab with Simulation

Course Objectives:

- To study various feedback Amplifiers, oscillators practically
- To study various feedback Amplifiers, oscillators through software simulations.

Course Outcomes:

- To understand the concepts of various feedback Amplifier, oscillators practically
- To understand the concepts of various feedback Amplifier, oscillators through software simulations.

SYLLABUS

LIST OF EXPERIMENTS

1. Current series feedback Amplifier
2. Colpitts oscillator
3. RC-Phase shift oscillator
4. Two stage RC-Coupled Amplifier
5. Wein bridge oscillator
6. Hartley Oscillator
7. Class-B Push pull Amplifier
8. Voltage series feedback Amplifier
9. Common source FET Amplifier
10. Tuned Voltage Amplifier
11. Applications of Operational Amplifier
12. Frequency response of Op-amp

(Software Simulation)

13. Common emitter and common source Amplifier
14. Two stage RC coupled Amplifier
15. RC Phase shift oscillator using transistors
16. Class-A Power Amplifier (transformer less)
17. Class-B complementary symmetry Amplifier
18. High frequency common base (BJT) and common gate (JFET) Amplifier

EC-2108

Digital ICs and HDL Lab

Course Objectives:

- To study logic gates, realization of Gates by using universal building blocks practically.
- To study flip-flops, registers and counters practically.
- To study logic gates, realization of Gates by using universal building blocks through software simulations.

Course Outcomes:

- To understand the concepts of logic gates, realization of Gates by using universal building blocks practically.
- To understand the concepts of flip-flops, registers and counters practically.
- To understand the concepts of logic gates, realization of Gates by using universal building blocks through software simulations.

SYLLABUS

LIST OF EXPERIMENTS

HARDWARE EXPERIMENTS

1. Logic Gates
2. Realization of Gates by using universal building blocks
3. Realization of SOP and POS
4. Verification of Demorgan's Laws
5. Half Adder & Full adder
6. Function generation by using Decoders & Multiplexers.
7. Realization of Flip - flops
8. 4-bit Ripple counter
9. Mod-8 Synchronous counter.
10. 4 - bit Shift-register
11. Seven segment display

SIMULATION EXPERIMENTS

1. Simulation of Logic gates
2. Simulation of Full adder
3. Simulation of Multiplexer & De-Multiplexer
4. Simulation of Decoder & Encoder
5. Simulation of Flip flops (SR & D)
6. Simulation of Up-down counter& Shift register

EC-2109

SKILL ORIENTED COURSE

MATLAB PROGRAMMING

Course Objectives:

1. To Impart the Knowledge to the students with MATLAB software. [This enhances programming knowledge in Research and Development].

2. To provide a working introduction to the Matlab technical computing environment. [Themes of data analysis, visualization, and programming].

3. To introduce students the use of a high-level programming language, Matlab. [scientific problem solving with applications and examples from Engineering].

Course outcomes:

By the end of this course, the student will be able to 1. Understand the basics of Matlab

2. Break a complex task up into smaller, simpler tasks

3. Tabulate results and Analyse.

Chapter 1

Introduction to MATLAB

The MATLAB desktop, the command window, the command history window, the MATLAB workspace, getting help, special symbols

Chapter 2

MATLAB Basics

Matrices and Vectors: Input, Indexing (or subscripting), Matrix manipulation, Creating vectors. Matrix and Array Operations: Arithmetic operations, Relational operations, Logical operations, Elementary math functions, Matrix functions, A Special Note on Array Operations.

Chapter 3

Introduction to plotting

Using simple x, y plots, printing a plot, exporting a plot as a graphical image, multiple plots, line color, line style, marker style, grid and legend.

Chapter 4

Script files and functions. Command- Line Functions: Inline functions, Anonymous functions, Finding the determinant of a matrix, finding eigenvalues and eigenvectors, solving a linear system, roots of a polynomial, matrix factorizations, Generation of Various Signals and Sequences (Periodic and

Aperiodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc, exponential. generation of random numbers.

Text Books.

1. A Guide to MATLAB for beginners and Experienced users by Brian R.Hunt, Ronald R Lipsman.
2. Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers by Rudra pratap.

Exercise :

1. Suppose that x=3 and y=4 Use MATLAB to evaluate the following expression:

$$\frac{x^2y^3}{(x-y)^2}$$

2. Answer the following questions for the array shown here.

$$\texttt{array1} = \begin{bmatrix} 0.0 & 0.5 & 2.1 & -3.5 & 6.0 \\ 0.0 & -1.1 & -6.6 & 2.8 & 3.4 \\ 2.1 & 0.1 & 0.3 & -0.4 & 1.3 \\ 1.1 & 5.1 & 0.0 & 1.1 & -2.0 \end{bmatrix}$$

   (a) What is the size of array1?

   (b) What is the value of array1(1,4)?

   (c) What is the size and value of array1(:,1:2:5)?

   (d) What is the size and value of array1([1 3], end)?

3. Assume that array array1 is defined as shown, and determine the contents of the following subarrays

$$\texttt{array1} = \begin{bmatrix} 1.1 & 0.0 & -2.1 & -3.5 & 6.0 \\ 0.0 & -3.0 & -5.6 & 2.8 & 4.3 \\ 2.1 & 0.3 & 0.1 & -0.4 & 1.3 \\ -1.4 & 5.1 & 0.0 & 1.1 & -3.0 \end{bmatrix}$$

   (a) array1(3, :) (b) array1(:,3) (c) array1(1:2:3,[3 3 4]) (d) array1([1 1],:)

4. The voltage across a resistor is related to the current flowing through it by Ohm's law V=IR and the power consumed in the resistor is given by the equation $P=I^2R$. Write a program that creates a plot of the power consumed by a 1000 Ω resistor as the voltage across it is varied from 1 V to 200 V. Create two plots, one showing power in watts, and one showing power in dBW (dB power levels with respect to a 1 W reference).
5. The equation of a straight line is y = mx + c, where m and c are constants. Compute the y-coordinates of a line with slope m = 0.5 and the intercept c = -2 at the following x-coordinates: x = 0, 1.5, 3, 4, 5 , 7, 9, and 10.
6. Create a vector t with 10 elements: 1, 2, 3, ... ,10.
   Now compute the following quantities:

$$x = t \sin t$$

$$y = \frac{t-1}{t+1}$$

$$z = \frac{\sin(t^2)}{t^2}$$

7. Plot y=sin x, 0≤ x≤ 2π, taking 100 linearly spaced points in the given interval. Label the axes and put "plot created by your name" in the title

8. Assume that the complex function f(t) is defined by the equation
$f(t) = (1 + 0.25i)t - 2$
Plot the amplitude and phase of function f for 0≤t≤4

9. Write an M-file to evaluate the equation $y(x) = x^2 - 3x + 2$ for all values of x between -1 and 3, in steps of 0.1. Do this twice, once with a for loop and one with vectors. Plot the resulting function using a 3-point thick dashed red line.

10. Create a mesh, surface plot and contour plot of the function $z = e^{x+iy}$ for the interval -1≤x≤1 and -2π≤y≤2π. In each case, plot the real part of z versus x and y.

11. Create an upper triangular matrix with the following

A=diag (1:6) + diag (7:11,1) + diag (12:15,2).

Now use the upper off-diagonal terms of A to make A a symmetric matrix with the following command: A= A+ triu (A,1)'.

12. Create a 10 by 10 random matrix with the command A= rand (10). Do the following operations.

EC-2110

MANDATARY COURSE

Professional Ethics and Universal Human Values
(Effective from 2020-2021 Admitted Batches)
(Common for all Branches)

Course Objectives:

The objective of the course is Six fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- This course will illuminate the students in the concepts of laws and its applicability to engineers
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection, Development of commitment and courage to act and also enable the students to imbibe and internalize the Values and Ethical Behaviour in the personal and professional lives
- To enable the students to imbibe the Values and Ethical Behavior in the personal and Professional lives
- The students will learn the rights and responsibilities Individual, employee, team member and a global citizen

Course Outcomes:

By the end of the course Student will be able to:

- Grasp the meaning of the concept – Law and also Get an overview of the laws relating to Engineers and also Apprehend the importance of being a law abiding person and They would have better critical ability
- Self-explore by using different techniques to live in harmony at various levels
- Analyze themselves and understand their position with respect to the moral and ethical character needed for a successful and satisfactory work life
- Students are expected to become more aware of themselves and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society

SYLLABUS

Need, Basic Guidelines, Content and Process for Value Education

•,Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation - as the process for self-exploration, Continuous Happiness and Prosperity - A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility - the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking, Include practice sessions and case studies.

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human being as: a co-existence of the sentient 'I' and the material 'Body', the needs of Self ('I') and 'Body' - happiness and physical facility, the Body as an instrument of 'I' (I being the doer,

seer and enjoyer), the characteristics and activities of 'I' and harmony in 'I', the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, P to ensure Sanyam and Health, Include practice sessions and case studies.

Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship

- Understanding values in human-human relationship: meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship, the meaning of Trust; Difference between intention and competence, the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship, the harmony in the society (society being an extension of family), Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order from family to world family, Include practice sessions and case studies.

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature, Understanding Existence as Co-existence of mutually interacting units in all – pervasive space, Holistic perception of harmony at all levels of existence, Include practice sessions and case studies.

Concept of Law and Law of Torts

- Understanding Essentials of a Valid Contract and the basics of contract law protecting rights and obligations, Introduction to the Law of Torts and the basics to protect oneself and the company Law affecting the Workplace Employers Responsibilities/Duties Hiring Practices, Introduction to Intellectual Property Law, Professional Code of Conduct for Engineers, Relationship between Law and Ethics, Include practice sessions and case studies.

Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations, Include practice sessions and case studies.

Text Books

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2
3. R. Subramanian, "Professional Ethics", Oxford University Press.
4. S.B. Srivasthva, "Professional Ethics & Human Values", SciTech Publications (India) Pvt. Ltd. New Delhi.
5. D.R. Kiran, "Professional Ethics & Human Values", TATA Mc Graw Hill Education.
6. Saroj Kumar, "Business Law" and Avtar Singh, "Law of Contract"

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book), Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”, E. FSchumacher. “Small is Beautiful”, Slow is Beautiful –Cecile Andrews, J C Kumarappa “Economy of Permanence”, Pandit Sunderlal “Bharat Mein Angreji Raj” and Dharampal, “Rediscovering India
4. G K Kapoor, “Business Law” and Sen & Mitra, “Business & Commercial Laws” and Calvin Frank Allen, “Business law for Engineers”
5. Hilgard, E. R.; Atkinson, R. C. & Atkinson, R.L. (1975). *Introduction to Psychology*. 6th Edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
6. Govindarajan, M; Natarajan, G. M. & Senthilkumar, V.S. (2013). *Professional Ethics & Human Values*. Prentice Hall: New Delhi
7. Gogate, S. B. (2011). Human Values & Professional Ethics. Vikas Publishing: New Delhi.
8. Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, “Engineering Ethics, Concepts Cases: 4e, Cengage learning, 2015.
9. Caroline Whitbec, “ Ethics in Engineering Practice & Research: 2e, Cambridge University Press 2015.

EC-2201
MATHEMATICS-IV

II/IV B.Tech. (Four Year Degree Course) & II/VI B.Tech.(Six Year Double Degree Course)
Semester-II
Mathematics – IV
(With effect from the admitted batch of 2020-2021)

Subject Code: **External Examination - Max. Marks: 70**
No. of Credits: 3 **Internal Examination - Max. Marks: 30**
No. of Periods/ Week: 3 **Total Marks: 100**

Objectives: The student should be able to use the concepts of difference equations, z-transforms, Numerical differentiation and Sampling theory. The student should know the applications of the difference equations in the deflection of a loaded string. The student should be able to estimate unknown parameters of population and apply the tests of hypothesis. They should be able to evaluate z-transform, inverse z-transforms and apply these transforms to solve difference equations. The student should be able to know the techniques in the evaluation of numerical solution of ordinary differential equations.

UNIT-I
(Functions of Complex Variables)

Introduction-Limit and continuity of f(z)- Derivative of f(z), Cauchy-Reimann Equations, Analytic Functions, Harmonic functions, Orthogonal systems, Applications to flow problems, Geometrical representation of f(z).
Integration of complex functions, Cauchy's theorem, Cauchy's integral formula and their applications.

Unit-II
(Conformal Mappings and Contour Integration)

Introduction to Conformal transformation, Bilinear transformation $w = \frac{az+b}{cz+d}$, Series of complex terms - Taylor's and Laurent's series (without proofs), Zero's and Singularities of analytic functions.
Residues and Calculations of residues, Cauchy's Residue Theorem, Evaluation of real definite integrals: Integration around unit circle, semi circle.

UNIT-III
(Difference Equations & Z-transforms)

Introduction - Formation of difference equations - Linear difference equations - Rules for finding complementary function - Rules for finding particular integral - simultaneous difference equations with constant coefficients - Applications to deflection of a loaded string.

Introduction to Z-Transforms - Some standard Z-transforms - Linear Property - Damping Rule - Shifting U_n to the right and to the left-multiplication by n-Two basic theorems - Some useful Z-transforms - Inverse Z-transformation - Convolution theorem - Convergence of Z-transform - Two sided Z-transform - Evaluation of inverse Z-transform - Application to Difference equations.

UNIT-IV
(Correlation, Regression and Distributions)

Introduction - correlation - coefficient of correlation -Lines of regression.

Introduction to Discrete and Continuous Random Variables - Distributions: binomial distribution, Poisson distribution, exponential distribution, normal distribution.

UNIT-V
(Sampling Theory)

Introduction - Testing of hypothesis - Level of significance - Confidence limits - Test of significance of large samples - comparison of large samples- Test of significance for means of two large samples.
Student t-distribution - Significance test of sample mean - Significance test of difference between sample means - Chisquare test - Goodness of fit - F-distribution.

TEXT BOOK:

Scope and treatment as in "Higher Engineering Mathematics", by Dr.B.S.Grewal,43rd Edition, Khanna Publications.

REFERENCE BOOKS:

1. Graduate Engineering Mathematics by V B Kumar Vatti, I.K.International publications
2. Advanced Engineering Mathematics by Erwin Kreyszig.
3. A text book of Engineering Mathematics by N.P. Bali and Dr.Manish Goyal; Lakshmi publications.
4. Advanced Engineering Mathematics by H.K. Dass. S. Chand Company.
5. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Graw Hill Company.
6. Engineering Mathematics series by Chandrica Prasad.

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EC-2202

Electromagnetic Field Theory and Transmission Lines

Course Objectives:

- Define the Basic Electrostatic and Magneto static Law Derive the Maxwell's Equation and apply to the basic electromagnetic problem.
- Analyze the boundary conditions, at the interface of two different media and also time varying electric and magnetic fields.
- Explain the wave propagation in different types of mediums and also transmission line fundamentals.
- Demonstrate the smith chart-configuration

Course Outcomes:

- To evaluate the design and problem solving skills
- Able to define electrostatic and magneto static laws
- Able to derive the Maxwell's equations in static and dynamic fields
- Able to describe energy density on electric/magnetic fields' and poynting theorem.
- Able to analyze the EM wave propagation in different mediums
- Able to relate the wave propagation through transmission lines and compute the impedance using smith chart for matching the load impedance.

SYLLABUS

Electrostatics

Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy ensity, Convection and Conduction Currents, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance.

Magneto statics

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Inductances and Magnetic Energy.

Maxwell's Equations

Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Related Problems.

Electromagnetic Waves

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Polarization, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem

Transmission Lines

Introduction to Transmission line equations, Primary & Secondary constants Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Losslessness /Low Loss Characterization, Distortion , Loading, SC and OC Lines, Reflection Coefficient, VSWR, λ/8, λ/4, λ/2 line impedance Transformations, Smith Chart – Configuration and Applications.

Waveguides

Introduction, Rectangular Waveguides, electric and magnetic field patterns in TE10 and TE11 mode configuration, modes of TE wave in rectangular waveguide, field equations, impossibility of TEM wave propagation in waveguides, cutoff frequency of rectangular waveguide, propagation constant, wave impedance, phase velocity, group velocity, dominant mode and degenerate modes, related problems.

Textbooks

1. Electromagnetic Field Theory and Transmission Lines, GottapuSasibhushanaRao, Wiley India Pvt. Ltd. , New Delhi, 1st Ed.,2012.
2. Electromagnetics with Applications, Kraus and Fleisch, McGraw Hill, 1999.
3. Electromagnetic Field Theory and Transmission Lines, G.S.N. Raju, Pearson Education (Pvt., Ltd., New Delhi, 2005.

References:

1.Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Engineering Electromagnetics, W. H. Hayt Jr., McGraw Hill – New York.
3. EM Waves and Radiating Systems, E. C. Jordan, PHI, 1997.

EC-2203
Microprocessors and Microcontrollers

Course Objectives:

- To introduce the architecture and operation of typical microprocessors and microcontrollers.
- To familiarize with the programming and interfacing of microprocessors and microcontrollers.
- To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

Course Outcomes:

- Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
- Apply knowledge and demonstrate programming proficiency using various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems.

SYLLABUS

8086/8088 MICROPROCESSORS
Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings, the processor 8088, machine language instruction formats, addressing mode of 8086, instruction set off 8086,assembler directives and operators.

PROGRAMMING WITH 8086 MICROPROCESSOR
Machine level programs, programming with an assembler, Assembly language programs, introduction to stack, stack structure of 8086/8088, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88
Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255,interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255.Programmable interrupt controller 8259A, the keyboard /display controller8279, programmable communication interface 8251 USART, DMA Controller 8257.

ADVANCED MICRO PROCESSORS
Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386, real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386.The coprocessor 80387.

8051 MICROCONTROLLER

Introduction to microcontrollers, 8051Microcontrollers, 8051pin description, connections, I/O ports and memory organization, MCS51addressing modes and instructions, assembly language programming tools.

PIC MICROCONTROLLERS AND ARM 32-BIT MICROCONTROLLER

Overview and features, PIC16Cx/7X instructions, interrupts in PIC 16C61/71, PIC 16F8XX Flash controllers, I/O ports and timers. Introduction to 16/32 Bit processors, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

TEXT BOOKS:

1. A.K.Ray, K.M.Bhurchandi ,"Advanced Microprocessors and Peripherals", Tata McGraw Hill Publications, 2000.
2. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", OxfordUniversity Press, 2010.

REFERENCES:

1. Ajay V Deshmukh, "Microcontrollers", TATA McGraw Hill publications, 2012.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.

EC- 2204

Probability theory and Random Process

Course Objectives:

- Understand concepts of probability, conditional probability and independence.
- Understand random variables and probability distributions.
- Be familiar with some of the commonly encountered random variables, in particular the Gaussian random variable.
- Be able to obtain the distributions of functions of random variables.
- Be able to relate probability theory to real statistical analysis.
- Understand moment generating and characteristic functions.

Course Outcomes:

- To the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena.
- To obtain the concept of random processes and determine covariance and spectral density of stationary random processes.

SYLLABUS

Probability Theory
Sample spaces, Events, Probability definition and Axioms, Mathematical model of experiments, Probability as relative frequency, Joint and conditional probability, Properties of joint probability and conditional probability, Total probability, Bayes' theorem, Independent events: Two events and multiple events, properties of independent events.

Random Variables and Operations on one random variable
Random variable concept, Distribution function, Density function, Gaussian random variable, Conditional distribution and density function, Expectation, Moments, Functions that give moment, Transformations of a random variable.

Multiple random variables
Vector random variables, Joint distribution and its properties, Joint density and its properties, Conditional distribution and density, statistical independence, Distribution anddensity of a sum of random variables, Central limit theorem.

Operations on multiple random variables
Expected values of a function of random variables: Joint moments about the Origin, joint central moments, Joint characteristic functions, Jointly Gaussian random variables: Two random variables, n-random variables, properties of Gaussian random variables, Transformations of multiple random variables: One function, Multiple functions, Inequalities of Chebyshev and Schwartz.

Random Processes
The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Function and their properties, Weiner-Kinchine Theorem ,Gaussian Random Processes, Poisson Random Process.

Linear Systems with Random Inputs

System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes.

Textbook:

1. Probability Theory and Random Signal Principles, Peyton Z. Peebles,Jr, 4th edition Tata McGrew Hill Publishers,2002.
2. Probability Theory and Random Processes, S. P. Eugene Xavier, S. Chand and Co. New Delhi, 1998 (2nd Edition).

References:

1. Fundamentals of Applied Probability and Radom processes, Oliver C.Ibe, Elsevier Publications, 2007.
2. Probability, Random Variables and Stochastic Processes – Athanasios Papoulis and S. UnnikrishnaPillai, PHI, 4th Edition, 2002.

3. Probability theory and Stochastic Processes, B.PrabhakaraRao, T.S.R.Murthy, BS Publications, Hyderabad, 2012.

EC 2205

Analog Communication

Course Objectives:

- To introduce the concepts of analog communication systems.
- To equip students with various issues related to analog communication such as modulation, demodulation, transmitters and receivers and noise performance.

Course Outcomes:

- Gain the knowledge of components of analogue communication system.
- To analyze various methods of baseband/band pass Analog transmission and detection.
- Analyze and allocate performance objectives to components of an analog communication system and to design analogue communication systems.
- To evaluate the performance of analog communications in the presence of noise

SYLLABUS

Linear Modulation Systems:
Need for Modulation, Frequency Translation, Method of Frequency Translation, Amplitude Modulation, Modulation Index, Spectrum of AM Signal, Modulators and Demodulators (Diode detector), DSB-SC Signal and its Spectrum, Balanced Modulator, Synchronous Detectors, SSB Signal, SSB Generation Methods, Power Calculations in AM Systems, Application of AM Systems.

Angle Modulation Systems:
Angle Modulation, Phase and Frequency Modulation and their Relationship, Phase and Frequency Deviation, Spectrum of an FM Signal, Bandwidth of Sinusoidally Modulated FM Signal, Effect of the Modulation Index on Bandwidth, Spectrum of Constant Bandwidth FM, Phasor Diagram for FM Signals, FM Generation:Parameter variation method, Indirect method of Frequency Modulation (Armstrong Method), Frequency Multiplication, PLL FM Demodulator, Pre – emphasis and De –emphasis, Comparison of FM and AM.

Noise in AM and FM Systems:
Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Frequency Domain representation of Noise, The effect of Filtering on the Probability density of Gaussian Noise, Effect of filter on the power spectral Density of Noise, Narrow Bandwidth, Quadrature components of Noise, Power spectral density of Noise, Probability Density of Noise and their time derivatives, representation of Noise using Orthonormal coordinates, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold Improvement in Discriminators, Comparisons between AM and FM.

Radio Transmitters:
Classification of Radio Transmitters, Principle of a Radio Transmitters, AM and FM Transmitters, Radio Telegraph and Radio Telephone Transmitters, SSB Transmitters.

Radio Receivers:

Radio receiver Types, AM Receivers – RF Section, Frequency Changing and Tracking, Intermediate Frequency and IF Amplifiers, Automatic Gain Control (AGC); FM Receivers – Amplitude Limiting, FM Demodulators, Ratio Detectors, ISB Receiver, Comparison with AM Receivers, Extensions of the Super-heterodyne Principles, Additional Circuits.

Pulse Analog Modulation methods:

Pulse Modulation techniques, Sampling, Types of Sampling and its analysis, Time division Multiplexing, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse position modulation, Pulse Code Modulation.

Text Books:

Principles of Communication Systems, H. Taub , D. L. Schilling and GouthamSahe, TMH 3rd edition, 2007.
2. Principle of Communication Systems, Simon Haykins (2nd Edition).
3. Electronic Communication Systems, G. Kennedy, McGraw Hill, 1977 (2nd Edition).

References:

1. Modern Digital and Analog Communication Systems, B. P. Lathi (2nd Edition).
2. Communication systems, R.P.Singh and S.D.Sapre 2nd edition TMH 2008
3. Electronic Communications Modulation and Transmission, Robert J. Schoenbeck, PHI N. Delhi, 1999.

EC- 2206

Microprocessors and Microcontrollers Lab

Course Objectives:

- To study programming of 8086 ESA-86/88 kit for various operations like addition subtraction, multiplication etc
- To study 8086 programming using MASM 32 assembler.
- To study 8051 programming using KEIL software simulator

Course Outcomes:

- To understand the concepts of programming of 8086 ESA-86/88 kit for various operations like addition subtraction, multiplication etc
- To understand the concepts of programming of 8086 using MASM 32 assembler
- To understand the concepts of programming of 8051 using KEIL software simulator

SYLLABUS

LIST OF PROGRAMS 8086 ESA-86/88 KIT PROGRAMMING

1. Write a Program to add two 16 bit numbers stored in two memory locations 2000h and 2002h and store the result in another memory location 2004h.
2. Write a Program to divide two 16 bit numbers stored in two memory locations 2000h and 2002h and store the result in another memory location 2004h.
3. Write a Program to multiply two 16 bit numbers stored in two memory locations 2000h and 2002h and store the result in another memory location 2004h.
4. Write a Program to add two 32 bit numbers stored in two memory locations 2000h and 2004h and store the result in another memory location 2008h.
5. Write a program to find factorial of a given number.

8086 PROGRAMMING USING MASM32 ASSEMBLER

6. Write a program to perform addition operation on two multi byte numbers.
7. Write a program to perform subtraction operation on two multi byte numbers.
8. Write a program to sort a given set of hexadecimal numbers.
9. Write a program to find whether the given string is a palindrome or not.
10. Write a program for inserting an element at a specified location in a given string.
11. Write a program to convert BCD numbers into equivalent binary value. Write a subroutine for the conversion.
12. Write a program to read a keyboard and display the characters on the PC screen using DOS/BIOS commands.

8051 PROGRAMMING USING KEIL SIMULATOR

13. Write a program to generate a square wave of 50% duty cycle at pin P2.1 using timer 0 in mode1.Assume XTAL=11.0592MHz.
14. Write a program to send a message “WELCOME” serially at 9600 baud rate continuously through serial port of 8051.

8086 INTERFACING

15. Write a program to interface stepper motor.
16. Write a program to interface keyboard with 8279 display controller

EC- 2207

Analog Communications Lab

Course Objectives:

- To study various analog modulation and demodulation concepts practically.

Course Outcomes:

- To understand the concepts of analog modulation and demodulation concepts practically

SYLLABUS

LIST OF EXPERIMENTS

1. AM M Modulation and Demodulation
2. Low Pass Filter using passive components
3. High Pass Filter using passive components
4. Active Notch Filter
5. Frequency Modulation and Demodulation
6. Pre-emphasis and De-emphasis
7. T – Type attenuator
8. Band pass filter using passive components
9. Mixer characteristics
10. SSB-SC modulation and demodulation.

EC-2208
SKILL ORIENTED COURSE/SOFT SKILL COURSE

Python Programming

Course Objectives:
The Objectives of Python Programming are

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

Course Outcomes:

- Develop essential programming skills in computer programming concepts like data types, containers
- Apply the basics of programming in the Python language
- Solve coding tasks related conditional execution, loops
- Solve coding tasks related to the fundamental notions and techniques used in objectoriented programming

Unit-1
Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.
Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

UNIT-2
Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration The While Loop
Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods Text Files.
UNIT-3
List and Dictionaries: Lists, Defining Simple Functions, Dictionaries Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions
UNIT-4
Modules: Modules, Standard Modules, Packages.
UNIT-5
File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Text Books:
1) Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.

2) Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

Reference Books:

1) Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.

2) Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

EC-2209
MADATARY COURSE
ENVIRONMENTAL SCIENCE
(Effective from 2020-2021 Admitted Batches)
(Common for all Branches)

Course Objectives

The objectives of the Environmental Science course are to

- Familiarize the fundamental aspects of environment and the environmental management'
- Provide information of some of the important international conventions which will be useful during the future endeavors after graduation.
- Make realize the importance of natural resources management for the sustenance of the life and the society.
- Apprise the impact of pollution getting generated through the anthropogenic activities on the environment
- Provide the concept of Sustainable Development, energy and environmental management
- Impart knowledge on the new generation waste like e-waste and plastic waste.

Course Outcomes

After completion of the course the students will have

- Knowledge on the fundamental aspects of environment and the environmental management
- The knowledge on the salient features of the important international conventions
- Understanding of the importance of natural resources management for the sustenance of the life and the society.
- Familiarity on various forms of pollution and its impact on the environment.
- Understand the elements of Sustainable Development, energy and environmental management
- Knowledge on the new generation waste like e-waste and plastic waste.

SYLLABUS

Introduction: Structure and functions of Ecosystems-Ecosystems and its Dynamics-Value of Biodiversity-impact of loss of biodiversity, Conservation of bio-diversity. Environmental indicators - Global environmental issues and their impact on the ecosystems.
Salient features of International conventions on Environment: Montreal Protocol, Kyoto protocol, Ramsar Convention on Wetlands, Stockholm Convention on Persistent Organic Pollutants, United Nations Framework Convention on Climate Change (UNFCCC),

Natural Resources Management: Importance of natural resources management-Land as resource, Land degradation, Soil erosion and desertification, Effects of usage of fertilizer, herbicides and pesticide-watershed management.

Forest resources: Use and over-exploitation, Mining and dams – their effects on forest ecosystems and the living beings.

Water resources: Exploitation of surface and groundwater, Floods, droughts, Dams:benefits and costs.

Mineral Resources: Impact of mining on the environment and possible environmental management options in mining and processing of the minerals.
Sustainable resource management (land, water, and energy), and resilient design under the changing environment.

Environmental Pollution: Local and Global Issues. Causes, effects and control measures. Engineering aspects of environmental pollution control systems.

Air pollution: impacts of ambient and indoor air pollution on human health. Water pollution: impacts water pollution on human health and loss of fresh water resources. Soil pollution and its impact on environment. Marine pollution and its impact on blue economy. Noise pollution.

Solid waste management: Important elements in solid waste management- Waste to energy concepts. Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act and their amendments. Salient features of Environmental protection Act, 1986.

Sustainable Development: Fundamentals of Sustainable Development– Sustainability Strategies and Barriers – Industrialization and sustainable development. Circular economy concepts in waste (solid and fluid) management.

Energy and Environment: Environmental Benefits and challenges, Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Solar Energy: process of photovoltaic energy conversion, solar energy conversion technologies and devices, their principles, working and applications, disposal of solar panel after their usage. Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in context of India.

Management of plastic waste and E-waste: Sources, generation and characteristics of various e- and plastic wastes generated from various industrial and commercial activities; Waste management practices including onsite handling, storage, collection and transfer. E-waste and plastic waste processing alternatives. E-Waste management rules and Plastic waste management rules, 2016 and their subsequent amendments.

Text Books:

1. Bharucha,Erach (2004). Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education, University Grants Commission, New Delhi.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
3. Masters, G. M., &Ela, W. P. (1991). Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
4. Enger, E. and Smith, B., Environmental Science: A Study of Interrelationships, Publisher: McGraw-Hill Higher Education; 12th edition, 2010.

Reference Books:

1. Sharma, P. D., & Sharma, P. D. (2005). Ecology and environment. Rastogi Publications
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Clark R.S. (2001). Marine Pollution, Clanderson Press Oxford (TB)
4. Jadhav, H & Bhosale, V.M. (1995). Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
5. MoEF&CC, Govt. of India, CPCB: E-waste management rules, 2016 and its amendments 2018.
6. MoEF&CC, Govt. of India, CPCB: Plastic waste management rules, 2016.